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BUREAU OF HYGIENE AND TROPICAL DISEASES.

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MEDICAL ORGANIZATION AND DISEASES OF BURMA

BEFORE THE JAPANESE INVASION.*

By Charles WILCOCKS, M.D., M.R.C.P., D.T.M. & H.

Acting Director, Bureau of Hygiene and Tropical Diseases.

Burma is a country of over 14½ million inhabitants of divers races, largely Burmese but with Karens, Thais and Indians represented in very considerable numbers. The country is divided into 40 districts.

The medical organization comprises :—(1) the Public Health Service, with a Director and two Assistants and a staff of 40 doctors employed exclusively for this work, and 24 part time ; and (2) the curative service, the Inspector General of which controls the activities of about 300 hospitals and dispensaries of various sizes. In all, there are about 474 qualified medical men in Government service, Europeans, Indians and Burmese, in addition to those employed by mission organizations ; there are 509 nurses, male and female, 220 midwives, 305 compounders, 63 public health inspectors and 392 vaccinators. At Rangoon there is a full-time port health staff, which maintains a good disinfestation station for immigrants, at Hlegu a rural health unit maintained by the Rockefeller Foundation, and there are 43 infant welfare societies.

Laboratory services are provided at the Harcourt Butler Institute of Public Health, Rangoon, the Pasteur Institute, Rangoon, and at the district laboratories attached to all the important hospitals throughout the country, though many of these are equipped only for routine work. X-ray facilities are available at Akyab, Syriam, Pegu, Bassein, Tavoy, Taunggyi, Mergui, Toungoo, Mandalay, Maymyo and Rangoon General Hospital.

A list of the larger hospitals is included as an appendix to this report, but it may here be remarked that the Rangoon General Hospital is fully equipped for all modern medical work and is a hospital at which the teaching of medical students has been carried out. The Mandalay General Hospital is comparable with it in equipment, though not in size.

* In the next four issues of the *Tropical Diseases Bulletin* the following countries will be dealt with in the same manner :—The Andaman and Nicobar Islands, Thailand, Indo-China, the Netherlands East Indies.

At the Government Medical College, Rangoon, local students are taken to the degree standard of M.B., B.S., and about nine pass the final examination each year. At the Government Medical School, Rangoon, a shorter course (of four years) is given and about 35 licences to practise are issued each year. Nurses and midwives are trained at Rangoon and other places.

Nutrition and Nutritional Diseases.

Nutrition.—The diet of the Burmese is usually generous and varied. Rice is much eaten and in the rural areas is hand-pounded, and by this process the finished grain retains much of its outer layers, and the embryonic portion, which contains the vitamins essential to good health. In the towns, however, there is a tendency to use rice milled by mechanical means—but not so completely as the polished rice which has, in the process of milling, lost its vitamins. Beans and fresh vegetables are generally available, meat is taken in small quantity only, but fresh fish is largely consumed where it is available. Cattle and pigs are kept, the former especially by Hindus, who make considerable use of milk, but milk is not consumed much by the Burmese, though there has recently been an increase in the use of dried and tinned milk. Ghee is a common food. Fruits are plentiful, and one especially, gyinkhaboungthee, is known to be rich in vitamin C. Indian coolies too frequently subsist on a poor diet of rice to the exclusion of other, better, foods. This rice is often stored in rice mills, and during the rains tends to become mouldy. Such rice is frequently re-milled, and in this process the vitamin-bearing layers, sticky and friable with moisture, are removed, so that the final product is equivalent to polished rice, containing no vitamins.

Although the diet on the whole is fairly good, it is noted that malnourishment of children is found in 6–24 per cent. in certain districts. Vitamin deficiencies also occur, principally deficiencies in vitamins A and B.

Beriberi.—From what has been stated above it will be evident that the occurrence of beriberi in Burma is not uniform. It is uncommon in the rural Burmese and is chiefly found in Indian coolies, in whom it has a definite seasonal incidence, reaching its height in October, and probably connected with the effect of damp on rice mentioned above. It is also found in Telegu labourers, in Thais and Malays and some Burmese; high rates have been recorded in Mawlaik, Nyaunglebin, Kyaukse, Yandoon and, in mild epidemic form, in Syriam. Outbreaks have been recorded in timber-felling camps, military police posts, schools, lighthouses and lightships. In these, the individuals have been compelled to rely on rations stocked and probably deteriorated, and consisting too exclusively of rice.

In 1939, 3,916 cases and 179 deaths were recorded.

Rickets.—In 1939, 578 cases were recorded. It is a disease of childhood usually associated with lack of sunlight, and is somewhat rare in hot countries. *Scurvy* was reported 84 times in 1939. In a country where fruit is plentiful, cases of this disease should be rare.

Near Rangoon cases of *malnutrition oedema* are becoming more common. The cause of this condition is food deficient not so much in quantity as in quality, especially deficient in protein. There is usually also hookworm infection and malaria.

Epidemic dropsy may be mentioned here though it is probably not a deficiency disease but a poisoning due to contamination of mustard oil (used for cooking) by the products of the plant *Argemone mexicana*, which grows with the mustard. Outbreaks occur, often in family groups or persons obtaining the contaminated oil from one source. It is an acute disease and may end fatally; it is often seen in Indians who make much use of this oil, and has been found in persons using oil obtained from Calcutta. In 1924 there were 174 cases with 6 deaths in and around Rangoon, and in 1935 there was another outbreak there. Epidemic dropsy is notifiable.

Goitre due to deficiency of iodine in water is widely prevalent in certain hilly localities, especially the Meiktila district, the Minbu area, the north and south Shan states and Kachin, in Upper Chindwin and Salween. It is most common in women and is not a serious condition.

Water, Sanitation, Intestinal Diseases.

Water supplies.—In the large towns water supplies are usually good, for instance the deep tube wells of Rangoon provide bacteriologically satisfactory water, especially in the dry season. This is frequently examined and is supplied to ships in the port. In addition Rangoon receives water from two lakes. In the rural areas water is obtained from the great rivers, for instance the Irrawaddy, but since these rivers are constantly used by boats, their water is constantly fouled. Elsewhere shallow wells are made by the natives and storage tanks have been used for many centuries. These wells are grossly contaminated by the natives, who have little understanding of the necessity for protection of the supplies. Wells, tanks and streams receive surface rain water which, especially after drought, carries into them the surface contamination of the vicinity, a matter of the greatest importance in a country subject to outbreaks of cholera.

For Europeans and bodies of troops or labourers the only safe rule is to make sure that all water supplied is thoroughly sterilized before issue. For large quantities, chlorination is easy and safe, for small quantities boiling is safe. Filtration by means of domestic filters is thoroughly unsafe and no such filters should be allowed; they give a false sense of security and may even add contamination to water.

Sanitation in towns is improving. The bucket system, with daily removal, is largely used, but more permanent and safe methods are being introduced. In the country districts the natives defaecate indiscriminately, but in some places pit latrines are used, and the construction of very satisfactory bored-hole latrines is encouraged by Government. But in the main the sanitary habits of the mass of the rural population are bad. It will be understood that diseases such as cholera, fevers of the typhoid group and the dysenteries can easily, under these conditions, spread in epidemic fashion.

Cholera epidemics have occurred at least six times since the beginning of this century, but the recent outbreaks have not been so extensive as those in the early years. The period from April to July is noted as that at which most cases occur; it is pointed out that wells and tanks are polluted after floods. This disease is particularly associated with the fairs, held periodically, at which there are large gatherings of natives. But the distribution of cases through the country is always scattered and the disease is rarely absent from all parts at once. The incidence is invariably higher in Lower than in Upper Burma, and is especially

high in the delta. In 1934–35 there were outbreaks in Myaungmya, Bassein, Pyapon, and Maubin; in 1939 in Tharrawaddy, Henzada, Maubin, Pyapon and Prome, and deaths were numerous in the Pegu and Irrawaddy divisions.

In the main, cholera is a water-borne disease, but it has been reported that true cholera organisms have been found in prawns caught at Rangoon; the possibility of transmission on uncooked or insufficiently cooked food should not be overlooked, and native-grown vegetables should never be eaten raw, the more so because human faeces are used for the fertilization of market gardens. Transmission by flies is also probable. Prevention is largely a matter of protection of water supplies, and of safe sanitary methods, but protective inoculation is used on a large scale throughout the country.

There were 1,468 reported deaths from cholera in 1939; the actual number was, no doubt, higher.

Cholera has been one of the great problems among refugees in the Chinese-Japanese war; it may be expected in Burma if any refugee movements occur, and its control under these conditions is most difficult.

Fevers of the typhoid group are common; in 1939 there were 1,896 cases with 184 deaths, but there is little doubt that the actual incidence was greater than these figures suggest. Incidence has been noted as high in Allaumyo, Taunggyi, Yandoon, Zigön and Namtu. These diseases are often relatively mild in the natives, but are usually severe in uninoculated Europeans. It is thought that, from long exposure to infections, the natives have acquired some immunity against them.

Dysentery is exceedingly common. The bacillary form was responsible in 1939 for 24,115 known cases, with 189 deaths. On the other hand, in one report it is stated that dysentery and diarrhoea caused 6,431 deaths in that year. These diseases are at their maximum in July; the highest rates are reported from Akyab, Kyaukse, Pyapon, Kyaukpyu and Meiktila, but all districts are implicated. Bacillary dysentery is very severe in children and it is probable that this disease is responsible for a large part of the high infant mortality and that by no means all the cases are reported. The severe Shiga form has been found in military stations, but the milder Flexner form is the more common, and the Schmitz and Sonne varieties are also found. Amoebiasis causes much chronic ill health. In 1939 there were 13,146 cases with 182 deaths. Both these diseases are very liable to affect Europeans. Dysentery has always been a major menace to armies, and may be expected in the event of large-scale movement of refugees.

Insect-Borne Diseases.

Malaria is the commonest disease in Burma and may be expected in any part of the country, though its intensity varies very widely in different areas. On the coast, in the plains and round Rangoon it is not particularly prevalent, but in the inland foot-hill areas and round Lashio and the western end of the China-Burma road, it is intense, especially after floods caused by heavy rain, when it may become epidemic. It is prevalent in Upper Chindwin, especially at Kalemyo, Pantha, Tamu, the Kabaw valley, Indaw and Homalin. It is endemic in the northern and southern Shan states and the incidence rates are high in Shwebo (especially Kyunhla), Prome (Padaung, Shwedaung and

Thegon), Pyapon (especially the Pyindaye forest reserve area), Lower Chindwin (Karu, Budalin, Yinmabin and Pale) and elsewhere.

The highest death rates for malaria are usually reported in winter, especially in December ; regionally, the highest death rates are found in Lashio, Shwedaung (where epidemics have occurred in recent cold seasons), Mawlaik, Mergui, Myanaung and Myitkyina. The rate in Lashio has doubled in recent years, but where antimalarial work has been done a considerable reduction has been effected. In 1939 there were reported 120,904 deaths from fevers in the whole country, but these no doubt include some from causes other than malaria. Nevertheless, there must be a large number of deaths from malaria, especially in infancy, which are not recorded.

In addition to the deaths it causes, malaria is responsible for an enormous amount of ill health and it may be taken as true that in the greater part of the country every person suffers many attacks, especially in childhood. In places where the incidence is largely seasonal, these attacks may persist throughout life ; in places where the incidence is perennial, immunity may be acquired in early life.

The common form of the disease is malignant tertian, but in most places the benign tertian form is also seen, for instance at Mawlaik in the cold season. Round the western end of the China-Burma road malignant tertian malaria accounts for about 70 per cent. of the cases, benign tertian for about 26 per cent. and quartan for the rest. On this road malaria has been so prevalent that it has constituted a major threat to the success of the undertaking ; it has caused serious incapacitation of the labourers engaged in building and maintaining the road and on the transport workers. Energetic measures, however, were taken to protect the labour camps and rest houses, and considerable success was achieved.

In the mountain valleys and the foothills six species of *Anopheles* are important. *Anopheles hyrcanus* var. *sinensis* breeds in open or grass-covered stagnant water, in swamps, ponds, lakes, wells, drains and ditches and in the water of rice fields. It is an important carrier. *A. jeyporiensis* similarly breeds in rice fields, in grassy river margins and drains ; it too is an effective carrier. *A. minimus* is the most dangerous species, readily attacking man ; it breeds in the shaded water of the grassy edges of streams and drains and is ubiquitous in the mountains. *A. maculatus*, another important vector, breeds in the grassy edges of streams and drains and even in the unshaded quiet pools found in rocky streams, and in seepages. This mosquito prefers water open to the sky. *A. culicifacies* breeds in canals, pools in rocky streams, furrows, seepages, road puddles and the borrow pits from which earth has been taken for engineering purposes and which become ponds in the rainy season. *A. annularis* breeds in swamps, pools and rice fields and in tree holes. It may be found in forest pools.

It has recently been found that *A. leucosphyrus* is an important carrier in Assam. This species is also found in Burma, Malaya, the Netherlands East Indies and the Philippines. It breeds in small collections of stagnant water in jungle country, in springs and hoof marks, and is responsible for malaria in forested areas. The adults are fairly often found in houses and attack man readily.

In the plains, where malaria is not so prevalent, and in coastal areas, there is some breeding of species which favour rice fields, pools and drains, but these species are not usually such efficient carriers as those which choose stream water.

Nevertheless, outbreaks do occur in these regions and one such, 12 miles north of Rangoon, was transmitted largely by *A. hyrcanus* var. *nigerrimus*, a swamp breeder. In this place *A. minimus*, *A. vagus*, *A. subpictus* and *A. barbirostris* were also found, but were regarded as of less importance. In the Arakan coast area the incidence of malaria is on the whole moderate, but at the foot of the hills high spleen rates were found in children, 38·9 per cent. in Pauktu and Dotan, and as much as 85·7 per cent. in Kwingyi and Padegaw.

Antimalaria measures have been taken to prevent the breeding of dangerous species. At Lashio and along the China-Burma road extensive control measures have been undertaken. These include the clearing of drains, draining of marshes and ponds, the oiling of collections of water of many kinds, the use of Paris green. These measures are vigorously applied, especially near labour camps and rest houses, and the general rule is that no mosquito breeding should be permitted within half a mile of such camps or rest houses.

Adult persons entering endemic areas, and who have not acquired immunity, suffer heavily from the disease, and malaria is a major factor in the conduct of military campaigns. In large engineering works great care should be exercised either to recruit labour gangs locally, in which case they are probably fairly immune, or, if they must be recruited from outside, to protect them against mosquitoes. Drug prophylaxis is an important means of control in troops and labourers.

Plague is now endemic in Burma, in both towns and country districts, and some thousands of deaths are reported every year. In 1939 there were 3,266 known deaths from this disease, but the actual total was probably higher. About 70 per cent. of the deaths are reported from towns, especially from Rangoon and the towns on the main lines of communication by river or rail. Along these routes the infection is largely, no doubt, carried in merchandise. Endemic areas are Meiktila (especially the town of Mahlaing), the town of Pyawbwe, the northern Shan states (where at the village of Namkham there was recently an outbreak of pneumonic plague). A similar pneumonic outbreak was reported from Padigon in the district of Prome. Plague is also found in the Myingyan district (at Natogyi, Shwebo and Yamethin), at Allaumyo, and in the district of Sagaing. At Shwebo it is noted that the bazaar is the spot in which the cases occur, and this is true of other towns.

In some of these places it is known that by no means all the cases are reported.

Plague shows seasonal variations in incidence. The highest numbers of deaths usually occur in the season November-April and in Lower Burma there may be a secondary rise in July.

Rats are found in large numbers in Rangoon, which, like all other ports, is infested with these pests. They abound in the storehouses and godowns and in the rice mills, where a plentiful supply of food is available. Suitable building arrangements can be effective in preventing the entry of rats into stores, but many of the existing buildings have not been made rat-proof. On the lines of communication stores and shops are infested, and ships and river craft usually carry them. Rats and their fleas are carried in bags of grain or in bales of cotton.

In human plague rats are important in proportion to their nearness to man, and different species vary in their habits and therefore in their importance to man. In Rangoon and elsewhere in Burma *Rattus concolor*, *R. rattus* and *R. norvegicus* are the prominent species in this connexion.

The two former are closely akin and are domestic in their habits. They inhabit houses and stores, they are climbing rats ; *R. rattus* is present but *R. concolor* is the more common. *R. norvegicus*, the brown rat, is rather a field or sewer dweller than a domestic species, and is less in contact with man and therefore of less importance.

Of the fleas *Xenopsylla cheopis* is the most effective carrier and is responsible for most human cases, but in some parts of Burma *X. astia* is more commonly found on the animals. This flea will transmit the disease to man but not nearly so readily as *X. cheopis*.

Preventive measures are taken to keep the rat population down, in ports by the fumigation of ships and the prevention of transit of rats between ships and the shore, and by the rat-proofing of stores and godowns. Inland, attempts are made to prevent rat breeding in buildings, but as yet such measures have been but scantily applied, and it is, indeed, an enormous task to render native bazaars rat free. Preventive inoculation is practised on a considerable scale, and in 1939 over 10,000 persons were so inoculated.

Typhus is probably more common in Burma than has been suspected, and, though definite information is scanty, there are probably four forms. The louse-borne type, transmitted from man to man by the louse, was reported in 56 cases in 1929. The murine type, or shop typhus, transmitted from rat to man by the rat flea, occurs in many eastern ports and is probably to be found in Burma. It is reported that a tick-borne form occurs inland, and serological tests indicate that the mite-borne form, similar to the scrub typhus of Malaya and to tsutsugamushi disease, is to be found in the country districts where the mites live in the scrub. In 1938, 635 cases of typhus, the vector of which was not known, were reported in addition to cases of louse- and tick-borne typhus ; some of these, no doubt, were mite-borne.

Of these forms of typhus the most serious is the louse-borne type, which has broken out in recent years in large numbers of refugees from the war in China, and which might break out, under similar conditions, in Burma. It is a disease of high mortality and is particularly associated with conditions of poverty and overcrowding of insanitary peoples in whom louse infestation is prevalent. The other forms are less severe and are much less likely to occur in epidemics, though there is good reason to believe that the murine type, which is usually found in isolated cases in rat-infested houses, may be transmitted from man to man by the louse and may therefore behave, as in Shanghai, like the true louse-borne form.

No information is available as to the ticks which may transmit typhus in Burma, but it is known that the common dog tick, *Rhipicephalus sanguineus*, incriminated in the transmission of this form of typhus in the Mediterranean area and elsewhere, is found in Burma.

It has recently been pointed out that typhus has been found in the course of routine serum examinations of patients suffering from fever who would, in the absence of these examinations, have been diagnosed as cases of typhoid fever or of pyrexia of unknown origin, and as the vast majority of such patients are not as yet investigated serologically, there may be many cases of typhus which are not recognized.

It may be noted that the cases definitely diagnosed by blood examination, in a recent investigation, were from scattered areas in both Upper and Lower Burma, and that cases of mite-borne and flea-borne disease were found indiscriminately in both urban and rural

areas. In military operations the possibility of the mite-borne form, in troops operating in jungle country, should be borne in mind.

Dengue may be important because of the temporary incapacity it may inflict on bodies of troops. It is endemic in the neighbourhood of Rangoon, especially during the rainy season from April to September, and elsewhere. It is transmitted from man to man by *Aëdes aegypti*, found throughout the coastal districts and in some inland parts.

Kala azar is found, but in small numbers ; it should be borne in mind as a possible cause of prolonged fever. *Sandfly fever* may cause much ill health in Europeans.

Other Diseases.

Of the *helminthic* diseases *hookworm infection* is the most widespread and the most important, but its distribution is not even. In the delta region and along the coast it is moderately severe, and in those Indians who do not use latrines the infestation may be heavier than anywhere in Bengal or Assam. In the dry central zone of the country there is practically no hookworm and the inhabitants of the Shan states are but lightly affected. Hookworm infection tends to be high in estate labourers if sanitary conditions are poor.

Ascaris infection is common. Over a quarter of a million cases were reported in 1939. *Ascaris* infection is a reflection of the state of public sanitation.

Filariasis is not rare. *Guinea worm* infection is occasionally seen.

Tapeworm infection is fairly common.

Ulcers of the legs are exceedingly common, are often extensive and may lead to great destruction of tissue and permanent disability, and usually remain foul and discharging for months. They frequently arise from small injuries such as abrasions of the skin, acquired, for instance, in walking through bush country, and are often found in labour gangs. They are particularly associated with conditions of inadequate nutrition. These ulcers may play havoc with labourers engaged on engineering work and the steps for their prevention should include supervision of diet and prompt attention to all wounds, however trivial. Over a quarter of a million cases were treated in 1939.

Syphilis is very common ; in 1939 there were 39,791 reported cases. It is one of the most serious problems of the country, and is widely spread ; it is probably responsible for much of the infant mortality. *Gonorrhoea* is equally prevalent, and *soft sore* and other venereal affections have high incidence.

Leprosy is commoner in Burma than in most other hot countries and there is reason to believe that the Burmese have less resistance to it than the Indians. Certainly the more acute and infective form is more often seen in Burma than in India. In 1939 there were 11,599 reported cases. Surveys have shown that the incidence varies from 0·16 to 5·0 per cent. of the population, and in contacts the rates may be much greater. The highest rates are found in the central belt, from the Arrakan hills to the Shan States, and here the acute form is especially common.

Leper colonies exist at Monywa, Minbu, Kengtung, Meiktila, Sale, Magwe, Shwebo and Nyaunglun.

Tuberculosis is even more serious than leprosy. Deaths are recorded only in the towns, and in 1939 there were 2,766 deaths, the great

majority of which were due to tuberculosis of the lungs. It is stated that in Rangoon the death rate is four times as high as that found in England, and that the risk of exposure to infection is equal to that experienced in England. Infection is reported to be very low in Upper Burma, low in Lower Burma, and high only in Rangoon, but high death rates are recorded from other towns :—Myitkyma, Myaungmya and Mergui. There is a special dispensary for tuberculosis in Rangoon.

There were 6,692 cases and 887 deaths from *pneumonia* reported in 1939, but there is little doubt that the actual deaths far exceeded this figure. It is a common and fatal disease in the Far East, and little can be done to prevent it. Troops on military operations, and gangs of labourers, may be expected to suffer severely on account of the exposure they undergo. Respiratory diseases are reported to be exceptionally prevalent in Lower Chindwin. *Influenza* is usually seen sporadically, but may break out in epidemic form ; 48,555 cases were reported in 1939. *Measles* and *diphtheria* are seen, usually in children.

Cerebrospinal meningitis may be met, and although comparatively few cases are reported each year, this is a disease associated with overcrowding, which may spread widely in labourers and troops. There is a record of over 17,000 cases of *rheumatic fever* in 1939, but no details have been seen. *Smallpox* has not recently been reported in any great outbreaks ; vaccination is widely performed, but there is always a risk of introduction from abroad, and spread in the still unvaccinated peoples of both town and country areas. *Unspecified fevers* account for almost 100,000 cases each year ; these may include malaria, influenza, dengue, sandfly fever, leptospirosis or relapsing fever, cases of which are reported independently.

Tetanus is seen, and should be remembered especially in connexion with war wounds. A few cases of *rabies* are usually reported, but a large number of treatments are given each year in suspected cases.

Eye diseases are common, *conjunctivitis* is the most frequent and may be troublesome, but *trachoma* is more serious. Gonorrhoea is responsible for some of the cases of blindness in the natives, and *xerophthalmia*, a condition due to deficiency of vitamin A, should be remembered.

Snakes.—The common poisonous snakes of Burma include the krait (*Bungarus fasciatus*), the cobra (*Naja naja*), and the king cobra (*Naja hannah*). These are members of the cobra family and their venoms are poisonous chiefly by their action on the nervous system. The vipers include the daboia (*Vipera russelli*) and the common green viper, or bamboo snake (*Trimeresurus gramineus*). These produce intense necrotic reactions at the site of the bite, but whereas the daboia is deadly, the bite of the green viper is rarely fatal. Snake bite is common in Burma.

For troops and labour gangs the most common medical problems are those concerned with malaria, cholera, typhoid, dysentery, venereal disease, dengue, sandfly fever, hookworm infection and respiratory diseases, but it is of the greatest importance that the diet of these men should be adequate, not only in quantity but also in vitamin content. The most scrupulous care of water and food supplies, to prevent intestinal disease due to contamination, is essential. For the prevention of malaria experts should be consulted, but prevention by means of regular quinine or mepacrine administration should not be overlooked.

HOSPITALS.

A list of some of the larger hospitals.

Place	*Beds*
Akyab	141
Rangoon Gen.	516
,, Contag. Dis.	288
,, Observation	80
,, Kemmendine, leper	473
,, Sri Raimakrishna	200
,, Bishop Brigandet Home	120
Syriam	95
Pegu	92
Tharrawaddy	73
Prome	74
Pyapôn	74
Bassein	128
,, contag. dis.	52
Henzada	68
Myaungmya	70
Wakema	50
Toungoo	93
Moulmein	135
,, leper	144
Tavoy	82
Mergui	77
Mandalay	247
,, leper	304
,, ,,	584
,, Brit. Milit. hosp.	
,, Princess of Wales, eye hosp.	
,, Winchester Mission hosp.	30

Place	*Beds*
Myingyan	60
Bhamo	59
Myitkyina	101
Mogok	60
Shwebo	92
Sagiang	58
Mawlaik	55
Pakôkku	59
Thayetmyo	58
Lashio	75
Namtu (Burma Corp. Mines)	165
Namkham	150
Taunggyi	83
Kengtung leper	145

Also :

Mohnyin
Adelaide Sharp Memorial Hosp. (European doctor).

Mongnai
S. Shan States (European doctor —8 beds).

Nyaunghla
Burma Oil Co. Hosp. (European doctor).

Panglong Hosp.
(European doctor).

Malipa Kokang Hosp.
N. Shan State.

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SUMMARY OF RECENT ABSTRACTS.*

VII. HELMINTHIASIS.

Trematodes.

MARILL *et al.* (p. 466) have examined the nomad workers who come from the Saharan side of the Great Atlas Range to work temporarily in Algeria and elsewhere. There seems to be a vast focus of *Schistosoma haematobium* infection on the Saharan side of the Great Atlas Range, where the snail hosts are abundant, but most of the men who are passing eggs claim to be in good health. These transient workers are a danger to the people of Algeria, where snail hosts are to be found, and the authors discuss various measures which might be taken to prevent spread of the disease. The same authors (p. 467) describe conditions in part of the Department of Oran, where *S. haematobium* infection was found in 1935, after the institution of an irrigation system in the district. They give a list of the snails found in the area, and go on to indicate the means by which snails could be destroyed in the irrigation canals. They also advocate strict control of Moroccan immigrant workers, prohibition of bathing in the canals, improvement of sanitary facilities and other measures.

BARNÉOUD and GAUD (p. 469) have confirmed the work of MARRILL *et al.* (above) that there is heavy infestation with *S. haematobium* in the Tafilalet region of Morocco. They found, in boys aged 7–15, infestation rates up to 80 per cent., the high rates occurring where there is abundant water from irrigation works. This focus is probably old, and is part of a vast endemic area which includes all the palm groves south of the Atlas; it is probably from this area that the other Moroccan foci have originated. There are other foci in Tunisia and in the Algerian Sahara.

MARTÍN SÁNCHEZ (p. 848) describes what is claimed to be the first case of infection with *S. haematobium* to be recorded from the Canary Islands.

CAMPBELL-BEGG (p. 550) shows that urinary schistosomiasis is frequently overlooked in South Africa, though it is, in fact, the commonest cause of right inguinal pain in that country. He notes that a first infection may fail to cause symptoms, that a patient may be infected without eggs in the urine, that eosinophilia is a valuable sign in recent infections, and that cystoscopy is the only means of exclusion of the disease and the only valid test of cure. He points out that in the active stage of the disease there may be no urinary dysfunction, and quotes cases to illustrate certain of the points made.

DORMER (p. 398) has conducted a survey of school children in Natal, in which he found 10 per cent. with active urinary bilharzia. Eggs of *Schistosoma haematobium* were found in the uncentrifuged deposit of the urine of 99 per cent. of those children with haematuria at the time of examination. In most of the schools some children were passing blood in the stools; and in one the eggs of *S. mansoni* were found, in another those of *S. haematobium*.

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* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1943, v. 40. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

DAVIS (p. 251) has found infection [but whether with *S. haematobium* or *S. mansoni* is not stated] in 90 per cent. of 2,000 persons examined in a part of Southern Rhodesia. He describes a characteristic facial appearance in infected children, in which there is loss of subcutaneous fat in the region of the horizontal ramus of the mandible. This gives a triangular shape to the lower part of the face, viewed from the front, which differs markedly from the evenly rounded contour of the normal child.

GELFAND (p. 398) remarks that in Southern Rhodesia bilharzia is, next to malaria, the commonest disease. He gives in detail the clinical features of infection with *S. mansoni*, and makes the point that attention is concentrated too much on the local symptoms in the bowel or bladder, and that the general constitutional symptoms are overlooked, so that diagnosis is often missed if the local symptoms are absent or mild. Three types are observed. In the first there is a combination of fever, urticaria and eosinophilia; in the second the bowel symptoms predominate; in the third, cirrhosis of the liver and splenomegaly are found, and the condition favours the development of deficiency diseases and infections such as pneumonia and tuberculosis.

SCHWETZ and DARTEVELLE (p. 249) note that bilharzia [*S. mansoni*] is common all over the eastern border of the Belgian Congo; the main source of the infection appears to be the rivers and creeks, but the disease does not seem to be particularly prevalent in the fishermen of Lake Albert. Six species of *Planorbis* are named, and the authors think that most of them are capable of transmitting the infection. The only prophylactic measure at present possible is treatment of the patients. Referring to the high incidence in this region, SCOPS (p. 250), on the other hand, attributes infection, in large measure, to the inhabitants' practice of wading in the muddy, stagnant, lake water to fish, and advocates the prohibition of fishing by infected persons.

ENGELHARDT (p. 612) confirms the statement of KUNERT that intravenous injection of Bayer 205 provokes the production of eggs by *Schistosoma haematobium* in persons infected with this trematode. The drug, therefore, may be used for diagnosis in suspected cases in which the urine is persistently negative. A single injection of 1·0 gm. is satisfactory, and eggs may be found within 18 hours—sometimes within 3 hours. This test may also be applied as a test of cure after a course of injections of antimony preparations.

MINNING (p. 63) discusses the complement fixation test in bilharzia, for which he advocates, as antigen, alcoholic extracts of the digestive glands of infected snails. This test is useful in diagnosis and shows a marked group specificity within the genus *Schistosoma*, but it has been shown, in monkeys infected with *S. japonicum*, that there is no relationship between the complement fixation titre and the degree of acquired immunity. Skin tests, however, are more valuable than complement fixation tests, and with antigen prepared in the same way as *Trichinella* antigen, positive reactions may be obtained, in persons infected with *S. haematobium* or *S. mansoni*, after intradermal injections of the worm extract diluted up to 1 in 40,000. In normal controls there was no evidence of non-specific reactions.

CULBERTSON and ROSE (p. 471) have used an antigen derived from the frog distome *Pneumoneces medioplexus* for a skin test in the diagnosis of human schistosomiasis. They describe the preparation of the antigen from the flukes obtained from infected frog lungs; the effective fraction is water-soluble, and the ether- and alcohol-soluble portions

are less potent. Positive results were obtained in three infected human patients, but not in 12 controls; the reactions were immediate and powerful, and could be obtained even in a dilution of 1 : 200. It is probable that skin sensitivity may be maintained for two years after successful treatment.

KOPPISCH (p. 703) gives a description of the course of infection with *S. mansoni*. He notes that no planorbid snail of North America has yet been proved capable of acting as intermediate host, but there is no certainty that none exists until an exhaustive survey is made. The differences observed between the infections seen in Porto Rico and in Egypt are probably explained by the much heavier infections acquired in Egypt.

MAGATH (p. 156) describes experiments which indicate that chlorination of water to the degree of 0·2 parts per million kills the cercariae of *Schistosoma mansoni* in 30 minutes, with a safe margin. He also claims that rapid gravity sand filtration would render water safe [but WITENBERG and YOFE, this *Bulletin*, 1938, v. 35, 600, found that standard sand filtration will not hold back cercariae]. He points out that all streams in Porto Rico and Vieques should be regarded as contaminated because a very large proportion of the inhabitants are infected.

BRAUNE (p. 252) writes of two German preparations which can be relied upon to kill schistosome cercariae in water. One is a chloramine preparation, the other is calcium hypochlorite; each is available in powder or tablet form. Acid augments the action of the former. The hypochlorite is more useful for large quantities of water. Neither would kill species of *Bulinus* or *Planorbis* even in relatively strong solutions, but in the concentration sufficient to destroy cercariae, these two preparations were also effective against bacteria. The author notes that the Seitz filter layers in the German Army Knapsack Filter cannot be penetrated by cercariae.

LUTTERMOSER (p. 849) discusses the methods which may be used to destroy the snail *Planorbis* (*Australorbis*) *glabratus*, the intermediate host of *S. mansoni* in Venezuela. Some of these snails have been found alive after two months in dry earth in the laboratory, and the author considers that the drying of canals is of doubtful value, especially as in practice some water always remains in them. Reconstruction of the waterways could remedy this, but it is useless to improve the canals so long as the rivers remain infested. Control of vegetation would render breeding more difficult, but the author considers that treatment of the water is a more sensible and effective measure. Snails are killed by a 0·1 per cent. solution of recently slaked lime within a day or less, their eggs are also killed, and cercariae of *S. mansoni* are killed at half that strength within 15–60 minutes. The lime may be distributed by hand, and in a canal used for experiment it was found that one lime treatment every three months was enough; this also considerably reduced the bacterial content of the water. Destruction of snails, however, is only part of the control measures to be taken, which should include general sanitary improvements in which all sections of the population should cooperate.

CLASTRIER (p. 471) supports the contention of BARLOW that *Bulinus truncatus* withstands drying much longer than used to be thought possible. Barlow had found that it withstood winter drying of canals, in Egypt, for as long as 50 days, and in Kordofan for seven months.

YARWOOD and ELMES (p. 704) report a case of paragonimiasis in an African in Nigeria, who was accustomed to eat insufficiently cooked crabs and crayfish. In this case the lungs were not affected, but eggs apparently characteristic of *Paragonimus* were found in a cyst deep in the muscle of the levator scapulae. No adult trematodes were found, but the cyst had been ruptured during the operation for removal. The patient also had homonymous hemianopia, and it is suggested that multiple lesions of the central nervous system had been caused by the flukes. BYRD (p. 65) reports that *Paragonimus westermanii* has been found in the lungs of an opossum in Tennessee; hitherto it has not been known that the opossum could act as host for this parasite.

D'ALLAINES *et al.* (p. 472) describe in some detail the symptoms of three persons infected with *Fasciola hepatica* and diagnosed nine years after they had contracted the infection. In the first stage, when the parasite first reaches the liver, there are signs of hepatic disturbance with eosinophilia, but without eggs in the faeces. When the fluke becomes adult in the biliary canals there may be more or less acute symptoms, but these disappear when eggs appear in the faeces. The clinical signs are then those of biliary obstruction with a progressive and spontaneous decrease of the eosinophilia. The signs, however, are very variable, as the histories of these three patients show. Carbon tetrachloride and emetine were given to one patient, without evident benefit. MAZZOTTI (p. 253) notes that cutaneous and intracutaneous tests, with an antigen prepared from an extract of *Fasciola hepatica*, gave positive results in a patient infected with that fluke, but were negative in six with onchocerciasis and one infected with *Taenia saginata*.

CHIN and LI (p. 847) have made a survey of the metazoan parasites of cats in China. Among the worms found were *Paragonimus* and *Fasciola hepatica*, but *Clonorchis sinensis* was not seen.

LUBINSKY (p. 613) refers to foci of human infection with *Opisthorchis felineus* on the lower Dnieper (17 to 26 per cent. infected), on the middle and upper Dnieper, and in the Donetz and Desna basins. Infection was proved, by animal experiments, in the following fish :—*Tinca tinca*, *Chondrostoma nasus*, and *Leuciscus idus*.

CHEN (p. 254) describes the appearance and life history of *Centrocestus formosanus*, a Heterophyid trematode parasite of rats and other animals in Hong Kong and elsewhere. Metacercarial cysts have been found in certain fresh water fish and frogs, and if it can be shown that they infest edible frogs (which is probable) they may be of public health importance, since *Centrocestus* is transferable to men. It may have been overlooked in man since its eggs resemble those of common human flukes such as *Clonorchis sinensis*.

FERGUSON (p. 924) refers to the rather remote possibility that cercariae of certain strigeid trematodes may penetrate the eyes of persons who bathe in lakes in Wisconsin, Michigan and Minnesota. There has been no actual record of such occurrence, but the danger cannot be excluded.

Cestodes.

SUMMERS and WEINSTEIN (p. 924) report three children (of one family) infected with *Diphyllobothrium latum* in Florida, which is not usually regarded as in the endemic area.

SKVORTZOV and TALYSIN (p. 158) note a high rate of infection with *Diphyllobothrium minus* and *D. strictum* in the region of Lake Baikal. Three fishes and *Cyclops strenuus* are involved in the life cycle.

BONNE (p. 553), noting that human sparganosis is rare in the Malayan archipelago, gives an account of recent research. Sparganosis is common in frogs, and the adult worms are found in cats and dogs. Man may become infected by ingesting spargana or *Cyclops* containing fully developed procercoids. *Diphyllobothrium ranarum* is found in frogs and has been found in man.

In the diagnosis of *Taenia saginata* infection, PODYAPOLSKAYA (p. 474) has found that examination of perianal scrapings, or mere questioning of the patient, is more accurate than examination of faeces.

PODYAPOLSKAYA and KAMALOVA (p. 474) have found that antigens prepared from cysticerci of cattle and pigs are unsuitable for allergic skin tests in human *Taenia* infections and in bovine cysticercosis. Positive results were given in uninfected persons and animals, and a proportion of the infected failed to react.

GOTOR (p. 65) discusses the diagnosis of cerebral cysticercosis, laying emphasis on eosinophilia of the cerebrospinal fluid, which, if present, is a strong diagnostic point. It is not, however, always present, nor is eosinophilia in the blood. When eosinophilia is present, radiographic confirmation of the calcified cysts is of great value. The complement fixation reaction is an important aid to diagnosis, but should be considered in conjunction with the other signs.

Reporting on trials of various anthelmintics in the treatment of tapeworm infections (almost all *T. saginata*) in India, MUKERJI and MAPLESTONE (p. 925) conclude that carbon tetrachloride is the drug of choice, provided there are no contraindications to its use. With it they obtained 80 per cent. of cures, whereas with tetrachlorethylene the rate was 54 per cent., and with hexyl resorcinol 47 per cent. Carbon tetrachloride was given in the morning, on an empty stomach, in doses up to 3 cc. A dose of salts was given either at the same time, or 1½–3 hours later. The maximum dose (3 cc.) cured 89 per cent. of 27 cases in which it was given; the only toxic signs were drowsiness and giddiness, which rapidly disappeared.

WOLFE (p. 850) quotes figures to support his contention that hydatid disease is more common in Wales than elsewhere in Great Britain, and discusses transmission and the clinical aspects of the disease.

LASNIER and CASSINELLI (p. 614) elaborate the claim previously made by the first author that examination of the sputum, stained with Best's carmine, will reveal small portions of hydatid wall in persons suffering from this infection. The chitin fragments stand out clearly and the polysaccharide of the hydatid membrane takes up the stain avidly. Large fragments can be seen by the naked eye, but by this method minute fragments, sufficient for diagnosis, can be detected. The method is useful where a liver hydatid has ruptured into the lung, or where the cyst has suppurated.

PIROSKY *et al.* (p. 474) have studied the antigens in hydatid fluid which can be used for intradermal tests in *Echinococcus* infection. The active fractions are a protein and a polysaccharide, injection of each of which produces, in infected persons, a reaction marked by a central red papule, a zone of hyperaemia, and a zone of oedema. The protein produces stronger and more lasting reactions than the polysaccharide. The authors conclude from their investigations that this is a true

antigen-antibody reaction, and, to obtain the best results, they use the antigen in the highest concentration which does not cause a reaction in uninfected persons.

CHANDLER (p. 705) has made an experimental study of the nutrition of *Hymenolepis diminuta* in rats, by which he has established that the worm obtains most of its carbohydrate from the contents of the intestine of the host, but can absorb nitrogenous substances, and probably vitamins of the B group, from the intestinal mucosa of the host. Elimination of protein from the diet of the host had no evident effect on the growth and reproduction of the worms, but elimination of carbohydrate caused marked reduction and stunting. If these facts are true of other cestodes, the common idea that tapeworms produce their effects by robbing the host of its food and by producing toxins should be replaced by the view that they produce their effects on the nervous system and general physique by absorbing vitamins, proteins, and possibly hormones and other substances, from the mucosa of the host. It is possible that *Diphyllobothrium* absorbs the intrinsic factor (which converts the extrinsic factor in meat and yeast into an anti-pernicious-anaemia factor) so that pernicious anaemia results in individuals who have not enough of either the intrinsic or extrinsic factors.

LARSH (p. 322) has investigated the transfer of passive immunity from mice infected with *Hymenolepis nana* var. *fraterna* to their young. He found evidence of such transfer, partly while the young were *in utero*, but more strongly through the ingestion of the mother's milk. The results support other evidence which indicates that immunity to parasites resembles immunity to bacteria and viruses. He (p. 851) reports that white mice infected with *Hymenolepis nana* var. *fraterna* elaborated specific agglutinating, precipitating and complement-fixing antibodies.

CHANDLER (p. 323) records from Texas the first known case of human infestation with the cestode *Mesocestoides variabilis*, normally a parasite of foxes, skunks, dogs and other animals, and of hawks and eagles. The life cycle is not fully known, but the infection now reported was probably derived from the eating of improperly cooked flesh of a wild mammal or frog. The patient, a child of 13 months, had a history of poor appetite, abdominal pain and loss of weight; the worms were expelled after doses of oleoresin of *Aspidium*. *Charles Wilcocks.*

[*To be continued.*]

MALARIA.

PLATONOV, N. V. [**Epidemiology of the Subtertian Malaria in the Novosibirsk Province.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1942, v. 11, No. 5, 3–10. [In Russian.]

The predominant form of malaria in the Novosibirsk province of South-Western Siberia is benign tertian. Although in some parts of the country subtertian malaria occurs fairly frequently, the majority of local physicians regard it as an imported disease. While this may be true for most districts, the author is convinced that in certain settlements situated in the flood-plain of the river Obi the disease is endemic, since infections with *P. falciparum* occur regularly among the local population. This view is also supported by the meteorological

conditions in the affected areas. In these districts the mean summer temperature (above 19°C., lasting up to 43 days), the relative humidity and some other factors—such as cloudiness with its regulating effect upon the temperature—provide the optimum conditions for the development of the subtertian parasite in the anopheline mosquito, and for its spread among the local population. In the territory in question subtertian malaria is endemic in the basin of the river Obi and its tributaries south of 56·4°N. Lat., whereas to the north, east and west of this area only sporadic cases occur. *C. A. Hoare.*

LINDBERG, K. Le paludisme dans l'Iran. [**Malaria in Iran.**] *Acta Med. Scandinavica.* 1941, v. 107, No. 6, 547–78, 8 figs. & 3 maps. [Bibliography.]

The paucity of published information concerning malaria in Iran endows with special interest any publication dealing with the subject. The present report contains an account of observations made and of information collected during two relatively brief visits to Iran. Unfortunately visits to neither the Caspian Provinces nor the Persian Gulf area, the two most malarious parts of the country, coincided with the malaria transmission season. In such circumstances the amount of information provided is remarkable; it is, however, inevitably fragmentary, and difficult to summarize.

The provinces bordering the Caspian Sea, Guilan, Mazenderan and Gorgan, include the northern slopes of the Elbourz Mountains. The high mountains, denuded for the most part, afford pasturage and have a nomad population only. Malaria is not a problem here; Anopheles are not found at heights of 2,000 meters and over. In the ravines and valleys of the lower wooded mountains the scattered population suffers severely from malaria during the summer; the humidity is high. *A. superpictus* is a probable vector, but there is also a certain amount of rice cultivation, so some other species may be responsible. The plain, varying in width from 3 to 60 kilometres or more, contains the majority of towns and villages. Much of it is thickly wooded and there is an abundance of marsh and swamp, fed by numerous rivers and streams and by abundant rainfall (1,500 mm. in places). In some areas there are vast clearings where rice, tobacco, sugar cane, cotton, wheat and vegetables are cultivated. The presumed malaria vectors are *A. maculipennis*, *A. elutus* and *A. superpictus*; *A. pseudopictus*, *A. sinensis* and *A. bifurcatus* also occur. A large-scale clearing of the bush, permitting more intensive cultivation, systematic drainage and the suppression of rice cultivation, might make this a very prosperous area.

The localities most severely infested with malaria are in the west of Mazenderan; then come Guilan and the east of Mazenderan. The distribution appears to be patchy; Baboulser in east Mazenderan for example is almost free from malaria. The disease is most feebly endemic in the Gorgan province, which geographically is part of the Turkoman steppe. The transmission season appears to be from May or June to the end of September; the driest months are from April to August; the rainfall is abundant during the rest of the year.

Khouzistan is a large province in the south-west of Iran, the southern part of which is an extension of the Euphrates and Tigris basin, while the northern and eastern parts contain southern prolongations of the

high mountains of Louristan and of the central plateau. Malarial conditions differ widely in different parts of the province. Transmission is most active in May and June, and in October and November, the latter being the more important. All three species of plasmodia occur, *P. falciparum* being most in evidence. Doctors of the Petroleum Company have reported the presence of 11 species of *Anopheles* in the area of their operations: *A. superpictus*, *A. stephensi*, *A. elutus*, *A. pulcherrimus*, *A. rhodesiensis*, *A. sergenti*, *A. apoci* (Marsh), *A. turkhudi*, *A. hyrcanus* var. *nigerrimus*, *A. bifurcatus* and *A. algeriensis*.

In Bouchir, one of the three most important ports of Iran on the Persian Gulf, malaria is hyperendemic. A third of the patients treated in the hospital there in 1938 were suffering from malaria. The author found no adult anophelines during his visit in mid-February but he found *A. multicolor* breeding. This is the first report of this species from the Persian Gulf littoral. *Norman White.*

ZADÉH, A. Recherches sur le paludisme dans l'Iran. [**Research on Malaria in Iran.**] *Acta Med. Scandinavica.* 1941, v. 107, No. 6, 579–83.

The author, formerly director of the Pasteur Institute of Teheran, reports briefly the results of observations made in 1934 and 1935, regarding malaria in three localities of Iran. In the neighbourhood of the Arak Salt Lakes (Soultanabad) *A. maculipennis* and *A. superpictus* were found breeding in early summer. The spleen rates of five villages varied from 32 to 53. Parasites were found in 36 of 224 bloods examined; *P. falciparum* 16, *P. malariae* 17, *P. vivax* 1, mixed 2.

In the town of Khorramabad *A. maculipennis* and *A. superpictus* were identified. In the autumn the spleen rate of 286 children was 65·5 per cent. and the parasite rate 30 per cent. Of the positive findings 80 per cent. were *P. falciparum*, 10 per cent. *P. malariae*, 8 per cent. *P. vivax*, the remainder mixed.

In the Caspian provinces of Gorgan and Mazenderan *A. maculipennis* and *A. pseudopictus* were found breeding in ricefields in late spring. *A. superpictus* abounds in parts of Mazenderan. *A. hyrcanus* and *A. bifurcatus* were found but were not numerous. Spleen rates increased from east to west, from 32 to 63 per cent., and parasite rates from 5·7 to 20·9. *Norman White.*

REPUBLICA ARGENTINA. DEPARTAMENTO NACIONAL DE HIGIENE. Memoria de la dirección general de paludismo correspondiente al año 1942 [ALBERTO ALVARADO, C.]. [**Argentine. Report on the Year 1942 by the Director General of Malaria.**] 59 mimeographed pp., 1 chart & 3 figs. on 1 pl. 1943. Tucumán.

Much of the information contained in this administration report is of little more than local interest. The author comments on the unsuitability of the calendar year as a period to be covered in a report destined to describe the evolution of malaria in a country in the southern hemisphere, such as the Argentine. For example, heavy rainfall in November and December may determine whether any given year is classed as an abnormally wet one, but the effects of that rainfall only

become apparent in the early months of the following year. April is the month of maximum malaria incidence in the Argentine. July to June is the natural "malaria year." From June to October malaria transmission is in abeyance; the temperatures are too low for the mosquito cycle of development of the parasite.

Judging from the number of patients presenting themselves for treatment, there was less malaria in 1942 than in any of the previous six years; there was a 25 per cent. decrease in 1942 as compared with the previous year. The decline was shared by all six provinces in the endemic zone of the north-east as well as by four of the five provinces in the Litoral zone. Only in the Misiones territory, between Paraguay and southern Brazil, was there an increase. There was no death attributed to malaria. Malaria is a mild disease in the Argentine; this applies to *P. falciparum* infections as well as to the much more prevalent *P. vivax*. The frequency of parasites in 2,943 positive blood slides was: *P. vivax* 83·1 per cent.; *P. malariae* 9 per cent.; *P. falciparum* 6·8 per cent., and mixed infections 1·1 per cent.

Both oil and Paris green have been used as larvicides and a promising start has been made with the use of automatic flushing siphons. Popular education as to the nature and prevention of malaria has engaged much attention. *Norman White.*

BAUGÉ, R. Associations paludéennes dans le nord et dans le sud de la Tunisie. [**Mixed Malaria Infections in the North and South of Tunisia.**] *Arch. Inst. Pasteur de Tunis.* 1942, June, v. 31, No. 1–2, 145–53, 2 charts.

Two years' work in the examination of blood films, one year in Souk-el-Arba in north Tunisia and one year in Tozeur in south Tunisia, forms the basis of this account of the frequency of mixed malaria infections in the two regions. As an introduction the author gives clinical notes of two unusual cases, which show how severe and how resistant to treatment such mixed infections may be, and how seriously underfeeding may affect the evolution of malaria infections.

The first patient was admitted to hospital, with the signs and symptoms of chronic malaria, in a miserable condition. *P. falciparum* and *P. vivax* were found in his blood. He received the usual treatment which consists of quinine intramuscularly, 7 gm. given over a period of six days, on the first five days of which 3 tablets of quinacrine [mepacrine] a day are given; on the succeeding five days 3 tablets of premaline a day are administered. [One tablet of premaline contains quinacrine 0·1 gm., rhodoquine 0·005 gm., and praequine (plasmoquine) 0·005 gm.] Three weeks after the beginning of treatment the patient's condition had much improved. Then the Ramadan fast supervened; this the patient insisted on observing. Sixteen days later a pernicious attack of malaria developed, choleriform in type. Schizonts and gametocytes of both *P. falciparum* and *P. vivax* were numerous in the blood. For 48 hours the temperature was between 40 and 41°C. In spite of energetic treatment the patient died.

The second patient also had a *falciparum-vivax* infection. He, too, was very gravely ill, but for the most part the temperature was very subnormal, falling on one occasion to 35·8°C. He received the same specific treatment as the previous patient, which had, however, little or no

effect on the *P. falciparum* gametocytes. He responded to the injunction not to observe the Ramadan fast and he recovered.

In all 15,606 blood examinations were made in Souk-el-Arba ; mixed infections were found in 78. Triple infections, *falciparum, malariae* and *vivax*, were found in three. The association *falciparum-vivax* was the most common, 48 cases, *P. vivax* predominating. There were 22 *vivax-malariae* infections, and 5 *falciparum-malariae.*

In Tozeur, south Tunisia, 8,531 examinations were made ; 30 mixed infections were discovered of which only one was triple. Here the *vivax-malariae* combination was the most common, 13 cases, *P. malariae* predominating. There were 9 *falciparum-vivax* infections and 7 *falciparum-malariae.* In most of the *falciparum-malariae* infections in both the north and south of Tunisia *P. malariae* was the dominant species.

More than a third of these mixed infections were found in children below 10 years of age. Clinically they are more severe than ordinary infections. *Norman White.*

DE BURCA, B. & IMDAD ALI SHAH. **The Anopheline Mosquitoes of Eritrea and their relation to Malaria Transmission.** *J. Malaria Inst. of India.* 1943, Dec., v. 5, No. 2, 235–45, 6 figs. & 1 map. [14 refs.]

——. **A New Species of Anopheles from East Africa.** *Ibid.* 233-4.

The authors worked for two years in Eritrea, and add greatly to our knowledge of a region which was formerly very little known. Their travels took them to many parts of the north and centre, but the south, including Dancalia, was not visited.

A. gambiae was the commonest and most widely spread anopheline, and was found breeding as high as 8,000 feet. The commonest breeding place was a small sandy pool in a river bed, but larvae occurred in many other types of natural water, including water containers in houses. The insect was maintained breeding " apparently indefinitely " in cages of a foot cube (presumably fed on man). The authors are probably justified in thinking that in this area *A. gambiae* was the main or sole vector of malaria, but natural infection rates were curiously low (in 1,818 dissections, 27 with oöcysts, and 10 with sporozoites ; *i.e.* a sporozoite rate of 0·55 per cent.). The authors observed epidemic malaria at 6,300 feet, and were satisfied that transmission occurs at 6,600 feet, figures which appear unusually high. A point which may be connected with this is that several species of *Anopheles* find the conditions suitable at relatively high levels ; eleven species were identified at between 6,000 and 8,000 feet, the most abundant in this zone being *A. cinereus.*

Many facts of interest to the entomologist are recorded : *A. dancalicus* is apparently confined to southern Eritrea, and it may be doubted whether " *erythraeus* " exists ; *d'thali* is very widely distributed but *rhodesiensis* is also recorded ; *funestus* was rare, and found breeding at 7,200 feet ; *rupicolus* was abundant in one place, but does not appear to bite man or enter houses. One new species was discovered and is described as *A. amutis* in the second paper. Only the larva and male are known, and the relations of this species to others, beyond the fact that it is a *Myzomyia,* are uncertain. *P. A. Buxton.*

VISWANATHAN, D. K. & RAMACHANDRA RAO, T. **The Behaviour of *Anopheles fluviatilis* James as regards the Time of Entry into Houses and of Feeding.** *J. Malaria Inst. of India.* 1943, Dec., v. 5, No. 2, 255–60.

The authors have investigated the time at which *A. fluviatilis* enters houses, and at which it feeds.

The work was done in North Kanara, Bombay Presidency, in May and June. Observations on hour of entry were made in a tent, in which the investigators rested under mosquito nets, getting up every hour to catch any mosquitoes which had entered. In spite of their efforts they caught only 28 female *fluviatilis* (and smaller numbers of other species) in the tent. Of these, 22 were found in the tent either 30 or 90 minutes after it was dark outside, and none entered after 10.30 p.m. (local time), except one female and two males just after dawn.

The time of feeding was investigated in a house in which the inhabitants were asleep, and which was searched four times a night on several nights. Even so early as 8.30 (local time) one out of 19 female *fluviatilis* was freshly fed, and 14/20 were in that state at 11.30. But though some individuals fed early in the night it seems that they continued to come in and feed almost till dawn.

The authors compare their observations with similar work done elsewhere, for instance Thomson's discovery that *A. minimus* feeds in the latter part of the night. These differences in habit are clearly important in relation to the prevention of malaria by such methods as bed-nets. *P. A. Buxton.*

RAJINDAR PAL. **On the Longevity of *Anopheles fluviatilis* James under Controlled Conditions of Temperature and Humidity.** *J. Malaria Inst. of India.* 1943, Dec., v. 5, No. 2, 251–3, 1 chart.

ROBERTS, F. H. S. **Observations on *Anopheles annulipes* Walk. as a Possible Vector of Malaria. I. The Relative Susceptibility of *An. annulipes* and *An. punctulatus* var. *moluccensis* Sw. to Experimental Infection with Malaria Parasites.** *Australian J. Exper. Biol. & Med. Sci.* 1943, Dec., v. 21, Pt. 4, 259–62.

Anopheles annulipes Walk. is suspected of being responsible for the transmission of malaria in a certain number of cases in regions in Australia where the more usual carrier, *Anopheles punctulatus* var. *moluccensis* does not occur. *A. annulipes* has been infected with malaria experimentally and also used for transmission of *P. vivax* to general paralytics. It has, however, never been associated with epidemics over wide regions where it could have become infected, and in practice it seems to be a poor vector, but it is apparently potentially dangerous. Many factors such as mosquito-plasmodium relationship, avidity of adult for human blood, habitat, population density, etc., determine the importance of a species as a carrier. Only the first is considered here, a comparison being made between the results obtained with *A. annulipes* and the important carrier *A. moluccensis* under as nearly identical conditions of breeding and feeding as possible. It is concluded that under the conditions of the experiment (the temperature and humidity are not stated, although both influence behaviour considerably) *A. annulipes* was, if anything rather more ready to feed

on blood, and about equal numbers of the blood-fed insects survived the 10–14 days to dissection. As a host *A. annulipes* was not inferior as far as percentage and intensity of gut and salivary fluid infections with *Plasmodium vivax* and *P. falciparum* were concerned. It is concluded that any deficiencies which *A. annulipes* shows as a vector of malaria in nature are not due to defects in its hospitability to the parasites. Until further evidence is forthcoming it would probably be wise not to concentrate large numbers of gametocyte carriers in areas where *A. annulipes* is abundant. *W. A. L. David.*

EYLES, D. E. & COX, W. W. **The Measurement of a Population of** *Anopheles quadrimaculatus* **Say.** *J. National Malaria Soc.* Tallahassee, Fla. 1943, v. 2, No. 2, 71–83, 3 figs.

Methods of measuring population densities of mosquitoes are useful in giving information about the efficiency of control measures. The method employed was originally developed by F. C. LINCOLN in ornithological work and later applied and developed by C. H. N. JACKSON [this *Bulletin*, 1937, v. 34, 539], R. A. FISHER and W. L. STEVENS for use with the tsetse fly (*Glossina morsitans*) and is based on the following principle " A random sample of individuals is marked and at some later time a random sample is caught from the area under study and examined. A certain number of marked individuals are recaptured. Then the proportion of recaptures to total taken ought to be the same as the proportion initially marked to the total population, *i.e.* population is equal to

$$\frac{\text{total marked} \times \text{total caught when recapturing}}{\text{recaptures}}$$

Three experiments along these lines were carried out near Reelfoot Lake, Tennessee over a four-hundred-acre tract of land. Catching was carried out at various points distributed over the area, using the method described by EYLES [below]. The insects were marked and released at 16 points near favourable resting places. From preliminary observations it was decided to make catches every three days. Full tables are given for the three experiments. They show that measured successively at two-week intervals, the populations were 5,900,000, 3,000,000 and 4,050,000, which represented from 8,450–14,750 females of the species per acre during July and August. The influence of possible sources of error such as that introduced by weighing instead of counting insects captured, excessive dispersal after first catch, and uneven emergence of young adults, are considered. *W. A. L. David.*

EYLES, D. E. **A Method for Catching, Marking, and Re-examining Large Numbers of** *Anopheles quadrimaculatus* **Say.** *J. National Malaria Soc.* Tallahassee, Fla. 1943, v. 2, No. 2, 85–91, 5 figs.

During the past two years the author has developed a technique for catching, and where necessary marking, very large numbers of *A. quadrimaculatus* (the important malaria vector species in the U.S.A.) in connexion with studies of flight range, dispersal and populations [see EYLES and COX above]. The apparatus comprises a vacuum cleaner unit with a $\frac{1}{4}$ h.p. AC-DC motor and a long suction line. At the end of the suction line is the catching chamber which consists of a $6\frac{1}{4}$ inch diameter cylinder about 12–14 inches long, divided into two by a

gauze screen which holds back the mosquitoes. To one end of this wide cylinder is attached the suction line, while the other carries an extension in the form of a tube $3\frac{3}{4}$ in. in diameter by 16 inches long. The apparatus is used much in the same way as a vacuum cleaner; the insects are drawn in through the 16-inch tube and collect in the upper compartment of the wide cylinder. It is stated that 2–3 thousand mosquitoes can be caught at one time without injury. In order to avoid the tedious process of counting it is suggested that the container plus mosquitoes can be weighed and the weight of mosquitoes obtained by difference. On an average one gram of mosquitoes contains about 250–300 individuals. The method is thought to involve an error of under 20 per cent.

Marking the insects is carried out by spraying into the catching chamber fine aluminium or gold bronzing dusts. By comparison with untreated controls it was shown that this process does not harm the mosquitoes and that the results last up to 26 days. Examination of captured insects is most quickly carried out against a white background, each insect being held momentarily in the beam of a microscope lamp. Marked individuals shine brightly. About 15–25 thousand insects can be examined in a day. *W. A. L. David.*

KUMM, H. W. & ZÚNIGA, H. **Seasonal Variations in the Numbers of *Anopheles albimanus* and *A. pseudopunctipennis* caught in Stable Traps in Central America.** *Amer. J. Hyg.* 1944, Jan., v. 39, No. 1, 8–15, 3 figs.

The object of this study was to determine which species of Central American *Anopheles* were most abundant at the time of the year when malaria was highest. Collections were made between the years 1938 and 1942 at various places in Costa Rica and El Salvador. The traps were baited with horses or mules. The results obtained in Costa Rica show that *A. albimanus* was much more abundant (9,440 caught) than *A. pseudopunctipennis* (92 caught); in El Salvador, on the other hand, *A. pseudopunctipennis* represented 18·6 per cent. of the catch. In both the regions referred to *A. albimanus* became more abundant during the rainy season, while *A. pseudopunctipennis* was a dry season species. It was also demonstrated that the most malarious months of the year were usually preceeded by an increased prevalence of *A. albimanus.*

W. A. L. David.

WEATHERSBEE, A. A. **Observations on the relative Attractiveness of Man and Horse for *Anopheles albimanus* Weideman.** *Amer. J. Trop. Med.* 1944, Jan., v. 24, No. 1, 25–8.

The importance of a given species of mosquito as a vector of malaria is obviously bound up with the relative frequency with which it takes blood from man or other animals. It is now known that certain mosquito species are composed of biological races which prefer different hosts. An investigation of the preference shown by *Anopheles albimanus* carried out in Eastern Porto Rico proves that a horse is chosen in preference to man. The ratio is approximately 20–1. Two traps were prepared in similar positions near a fresh-water pond. One was occupied by a man and the other by a horse. The man slept under a mosquito net within the trap. Eight different horses and ten men were used on different occasions and on repeats being made, were paired off in different combinations. The men were blacks, mulattos and whites

and the horses also differed in colour. Throughout the experiment (20 nights) the man-containing trap collected 123 *albimanus*, and the horse trap 2,791. This represents a ratio of 1 to 22. The average per night showed a ratio of 1 to 21. There was no evidence that the colour of man or horse exerted any influence on the numbers caught. The catch in the man trap showed greater variation between individual men than appeared between individual horses. For this reason a horse is the preferred bait for investigations on *A. albimanus* populations.

W. A. L. David.

CAUSEY, O. R., DEANE, L. M. & DEANE, M. P. **An Illustrated Key to the Eggs of Thirty Species of Brazilian Anophelines, with several New Descriptions.** *Amer. J. Hyg.* 1944, Jan., v. 39, No. 1, 1–7, 2 pls.

The authors have organized a very widespread collection of isolated living female anophelines. They have studied the eggs of 30 species and no less than 28,000 individual batches of eggs, from very many parts of Brazil.

This work has produced a great increase in precise entomological knowledge, particularly welcome because so many American species present difficulties in identification. In some cases the egg characters are sharp, and can be used to discriminate species which in other stages are very similar. The paper is technical; it includes a number of notes, a key to the eggs of the 30 species, and figures.

P. A. Buxton.

KERN, B. & KUSTNER, H. Das "gewaschene Blutbild." (Verbesserte und vereinfachte Malariadiagnostik.) [**The "Washed Blood Picture"; an Improved and Simplified Method of diagnosing Malaria.**] *Münch. med. Woch.* 1943, Dec. 31, v. 90, No. 52/53, 750–51.

A combined thick and thin film is made by spreading half of the drop of blood to make the thin part. When dry the two parts of the film (the thick part first) are decolorized by immersion in distilled water. The film is then stained with a freshly prepared mixture of 20 drops of May-Grünwald stain, four drops of Giemsa's stain and 20 drops of distilled water. After staining for 3 minutes the slide is immersed in distilled water, to remove excess of stain, and dried. The process takes 7–10 minutes and for 100 films about 50 cc. of May-Grünwald stain and 10 cc. of Giemsa's stain are used; this, according to the author, is 10–20 times as quick as the usual method and takes only about half the usual amount of stain. [Using Butler's staining slab for staining thick films with Giemsa's stain (1 drop to 1 cc.), 20–30 minutes are required to 3–5 cc. of stain for 100 films; FIELD's method (this *Bulletin*, 1940, v. 37, 874) is much quicker.] It is claimed that with this method malaria parasites are quickly recognized and Schüffner's dots are well shown.

J. F. Corson.

SAKZSHEVSKY, E. B. [**The So-called Malarial Oedemata.**] *Klinicheskaia Meditsina.* Moscow. 1943, v. 21, No. 9, 43–4. [In Russian.]

During the autumn and winter of 1942 the author observed many cases of malaria accompanied by oedema of varying degree; some patients had oedema of the face and legs only, while in more severe

cases there were effusions into the body cavities, ascites being especially common. Oedema appeared in all the forms of malaria, usually in the second week of the illness, but only in those persons who had been exposed to cold and damp. There were no signs of heart failure, the blood pressure was normal, and the urine was also normal, but the blood proteins were decreased in amount. All cases were cured by quinine, rest, good food and small blood transfusions (200–300 cc.). Ascites was the most persistent symptom, often remaining for some time after the malaria was cured. The author does not accept the view that the oedema was caused by the malaria parasites but regards it as due to exposure to cold and damp. [It would seem probable that the hypoproteinaemia was also a factor.] *H. W. Swann.*

VOINO-YASENETSKY, M. V. [**Colitis and Malaria.**] *Klinicheskaia Meditsina.* Moscow. 1943, v. 21, No. 7/8, 61–6. [In Russian.]

There is some doubt whether dysenteric symptoms in subtertian malaria are caused directly by the parasite or are due to dysentery bacilli associated with malaria. The maturing forms of the malaria parasite in the vessels of the mucous membrane of the alimentary canal often cause no digestive disturbance, and the colitis observed in malaria has been shown by bacteriological examination (JOSEFFI, GABERLANDT, KELLY and others) to be of dysenteric origin.

The author has studied the question in post-mortem examinations and by bacteriological investigation. In 85 per cent. of cases of acute colitis dysenteric infection was found. The author concludes that colitis is not caused directly by the malaria parasite and that the term "malarial colitis" is therefore a misnomer. *H. W. Swann.*

SPRINGALL, A. N. **Heavy Density of *Plasmodium falciparum* Parasites in Malaria. Report of a Case.** *Amer. J. Trop. Med.* 1943, Sept., v. 23, No. 5, 533–5, 1 fig.

The case recorded is that of a 66-year-old black male who was brought to the Gorgas Hospital, Ancon, C. Z., in a moribund condition. He died. The density of *P. falciparum* in the blood was amazingly high. A count of 1,500 erythrocytes showed single parasites in 418, 2 parasites in 174, 3 in 56, 4 in 11, and 5 in 5. Thus 44·2 per cent. of the erythrocytes were infected and there were 66·8 parasites for every 100 erythrocytes. Several erythrocytes were found which contained six parasites and one containing eight was seen. All forms of the asexual cycle of development were seen in the peripheral blood as well as mature and immature gametocytes. *Norman White.*

CIUCA, M., BADENSCHI, G., CONSTANTINESCU, P. & TERITEANU, E. Nouvelles contributions à l'étude de l'infection à *P. malariae.* [**Further Contribution to the Study of *P. malariae* Infection.**] Reprinted from *Rev. "Stiintelor Med."* Bucharest. 1943, Sept.-Oct., No. 9–10, 19 pp., 24 figs. & 14 charts on 5 pls. (4 folding). [13 refs.]

This is a record of observations made on 293 patients subjected to malaria therapy with *P. malariae* in the Central Hospital, Bucharest. Two strains of *P. malariae* were used, one of Italian, the other of West African origin. The method of infection was the intravenous injection

of 5–10 cc. of infected blood. The Italian strain was used in 154 patients, the West African strain in 139. Parasites appeared in the blood of 95·6 per cent. of the former and in all the latter. These results compare favourably with those previously obtained by the authors in Socola [Rumania] where the majority of patients were drawn from the rural population. In Socola 8 per cent. of patients were refractory to the Italian strain and 23 per cent. to a Rumanian strain of *P. malariae*, in spite of the low incidence of quartan malaria in Rumania.

The parasite density was rarely high ; it exceeded 50 parasites in 25 microscopic fields in only 2 per cent. of cases. The parasite density of the donor's blood does not always influence either the incubation period or the parasite density in the recipient if the amount of infected blood injected does not exceed 10 cc. It is interesting to note that only 34·6 per cent. of the patients presented at any time both male and female gametocytes, a fact which explains in part the difficulty met in attempts to infect mosquitoes with *P. malariae*.

Forty-seven patients developed regular quartan fever ; 47 others had double quartan fever, and 23 triple quartan (quotidian fever). More frequent was the development of mixed types of fever, and 24 patients had very irregular fever charts. The duration of the febrile attack is longer than in infections with other types of malaria parasite : this probably explains, in part, the efficacy of treatment with *P. malariae*. The form and intensity of the fever seem to be independent of parasite density.

P. malariae is somewhat more resistant to both quinine and atebrin than are *P. vivax* and *P. falciparum*. [See also CIUCA *et al.*, this *Bulletin*, 1929, v. 26, 944 ; 1931, v. 28, 119.] *Norman White.*

COVELL, G. **The Prophylaxis and Treatment of Malaria in War.** *J. Malaria Inst. of India.* 1943, Dec., v. 5, No. 2, 129–57, 4 charts. [95 refs.]

The scope and objects of this contribution are stated in the last paragraph of the introduction as follows : "Many of the problems which were subjects of debate during the last war are now once more being widely discussed, and such well-worn topics as the relative merits of oral and intramuscular quinine and of so-called prophylactic or suppressive drug treatment are once more to the fore. Conversations with medical specialists and others have made it evident that many of these officers are unaware of the great volume of patient investigation which has been devoted to this subject, and of the conclusions arrived at as a result. It seems worth while, therefore, to summarize the available information on certain of the points under discussion." The author then proceeds to summarize the results of many of the outstanding investigations of the last 25 years into the use of antimalarial drugs and antimosquito measures. This is prefaced with references to the failure of malaria control measures during the last war.

Suppressive treatment should not be adopted indiscriminately ; it may be, in certain circumstances, the only method of keeping a body of troops on its feet. If quinine be used it should be given daily, the minimum effective dose being between 6 and 10 grains. In peace-time conditions mepacrine 0·2 gm. twice a week will mask symptoms in most cases, but for troops operating in highly endemic areas 0·1 gm. daily, or on six days of the week, is now used.

To explain the origin of divergent views still expressed as to the best means of treating the malaria attack, the author outlines the history of malaria treatment during the past two centuries. Many of the standard treatments now used are described, most of them entailing the use of much more moderate quantities of antimalarial drugs than the heroic doses of quinine commonly employed during the last war. A considerable proportion of relapses will occur despite whatever form of treatment is adopted. Intramuscular quinine therapy is not justified as a routine treatment: in the case of debilitated patients, and of patients suffering from wounds, there is a greatly increased risk of untoward results. If intramuscular medication is decided upon, mepacrine methanesulphonate (atebrin musonate) is preferable to quinine. Intravenous quinine is of the greatest value in certain emergencies.

With regard to the relative value of quinine and mepacrine in the treatment of malaria, there is little to choose; different strains of malaria parasites differ in their reactions to the two drugs in certain respects. It is probably true that relapses are fewer after a 5-day treatment with mepacrine than after a 5-day treatment with quinine. Quinine is more potent as an antipyretic.

The chief function of pamaquin is not the destruction of gametocytes, nor the suppression of the clinical attack, but the reduction of the relapse rate, especially in benign tertian and quartan infections, which are the most prone to relapse.

The special difficulties of carrying out necessary antimosquito measures in war conditions are described. Site selection of camps is the most important of malaria preventive measures in wartime. The spray-killing of adult mosquitoes has a wide field of application in war as in peace, and if the necessary supervision is unceasingly maintained, no other measure produces such dramatic and consistently good results.

The dustless method of applying Paris green, first described by Barber and his colleagues in Greece, is of special value in wartime, when transport difficulties impose the reduction of the weight of material carried to a minimum.

The importance of methods of personal protection against mosquitoes is stressed. The author considers that shorts are entirely unsuitable for campaigning in the Tropics. The success of methods of personal protection, like that of suppressive treatment, depends on the degree of antimalaria discipline obtaining among the troops.

[Anything like a complete summary of this paper is out of the question. The author might have rendered a greater service to those for whom the paper is written if he had concentrated more on the results of his own vast experience and less on the divergent views of others and on the historical background.] *Norman White.*

Raper, A. B., Ogborn, R. S. & Wilson, D. Bagster. **Studies in Malaria in the East Africa Command. I. Treatment of Subtertian Malaria in Africans.** *East African Med. J.* 1944, Mar., v. 21, No. 3, 66–72.

The results of a trial of three short courses of treatment for East African native soldiers suffering from subtertian malaria are reported. Each course was of only three days' duration. The limitation was designed to reduce the length of hospital treatment and to economize quinine. The first course was: 1st day, quinine 10 grains twice and mepacrine 0·1 gm. twice; 2nd and 3rd days 0·1 gm. mepacrine twice

daily. The second course consisted of mepacrine 0·1 gm. twice a day for three days. The third course was 10 grains of quinine twice daily for three days.

All cases were of uncomplicated active malaria; they were of all grades of severity. The only selection made was in cerebral malaria; there were three such cases while the trials were in progress, and these were treated with parenteral quinine. The authors do not consider that such phenomena as meningismus, irritability, and the minor degrees of toxic psychosis indicate cerebral malaria.

The patients were divided into two groups, immune and non-immune. An immune subject is one who grew up in a locality in which the malaria transmission season exceeds six months in the year. The total number of cases treated was 281. Effectiveness of treatment was estimated in terms of duration of fever and of parasitaemia. The results are tabulated below :—

Course of Treatment	Immune Cases		Non-Immune Cases	
	Total Cases	Average Duration of Fever from Start of Treatment	Total Cases	Average Duration of Fever from Start of Treatment
		days		days
1. Quinine and mepacrine...	22	0·96	104	1·51
2. Mepacrine	16	1·00	38	2·25
3. Quinine	20	1·28	81	1·88

In some cases fever was prolonged beyond the end of the three-day course, three times among 58 immunes and 16 times among 223 non-immunes. The longest period of fever was 7·5 days among non-immunes and five days among immunes.

A thick blood-film from each patient was examined daily. The average duration of parasitaemia (asexual forms) in the immune and non-immune groups respectively, was : quinine and mepacrine, 3·4 and 3·1 days ; mepacrine, 2·2 and 4·1 days ; quinine, 3·0 and 3·1 days. From a quarter to a third of the non-immune cases harboured gametocytes after treatment. The number of gametocyte carriers among the immunes was much lower.

Conditions made it impossible to estimate the relapse rate. On only one occasion was it necessary to repeat the course because of an early recrudescence.

Twenty-six immune and 26 non-immune patients were given no specific treatment. The average duration of fever in the immunes was 4·4 days, and in the non-immunes 9·3 days. The average duration of parasitaemia (asexual forms) in the immunes was 7·3 days and in the non-immunes more than 13 days.

The conclusions reached are that it is not necessary to admit "immune" Africans to hospital for malaria pyrexia but a short course of treatment will reduce their period of disability by a day or two. For "non-immunes" treatment is essential and hospitalization desirable. All three courses met most of the essential requirements ; the mepacrine and quinine course was the most satisfactory. *Norman White.*

WAELSCH, H. & NACHMANSOHN, D. **On the Toxicity of Atabrine.** *Proc. Soc. Exper. Biol. & Med.* 1943, Dec., v. 54, No. 3, 336–8.

Choline esterase is an enzyme which destroys acetyl choline, the substance responsible for the actions produced by stimulation of the parasympathetic (vagus) nervous system. Mepacrine (atabrine) inhibits choline esterase to an extent of 59 per cent. in a concentration of 10^{-5} molar, *i.e.* 4 microgrammes of free base per cc. [This concentration is reached in the leucocytes but not in the plasma during the clinical use of mepacrine.] Quinine and morphine are 200 times less effective, while eserine (physostigmine) is 100–200 times more potent. The authors suggest that the toxic effects produced by mepacrine, *e.g.*, gastro-intestinal irritation, may be due to this inhibition of choline esterase (which would be similar to stimulation of the vagus nerve) and that the toxicity of other antimalarials may similarly be due to their effect upon enzymes. [However, bradycardia is not prominent as a toxic symptom induced by mepacrine, although it would occur if the vagus was stimulated.] *F. Hawking.*

i. HEGSTED, D. M., MCKIBBIN, J. M. & STARE, F. J. **Nutrition and Tolerance to Atabrine.** *J. Nutrition.* 1944, Feb. 10, v. 27, No. 2, 141–8. [22 refs.]

ii. ——, ——& ——. **The Effect of Atabrine on Choline Deficiency in the Young Rat.** *Ibid.* 149–53, 1 fig.

i. The experiments described were made in order to determine whether certain diets influence the toxicity of atebrin when the latter is administered over long periods. Young albino rats and day-old chicks were used as test animals. Details are given of the ration, to which certain vitamins were also added. The effect of deficiency in protein and vitamins was investigated. The atebrin was distributed throughout the food in doses up to 65 mgm. per 100 gm. by spraying over it an alcoholic solution of the dihydrochloride, which was then allowed to dry. In some cases the experiments lasted 1 year and histological examinations were made of the tissues of rats which had received atebrin for six months. The authors point out that the results may not apply to man as some species tolerate the drug less well than others. Their results indicate that the maximum level of atebrin in the tissues is reached in 3–4 weeks on a diet containing 40 mgm. per cent.

The following are the authors' conclusions :—

" 1. Atabrine added to an adequate diet in levels such that the rat receives 25 mg. per kilogram per body weight per day or less is completely non-toxic as judged by growth, general appearance and behavior, gross and micropathology, and reproductive ability.

" 2. Atabrine levels of 40 to 65 mg. per 100 gm. of ration retarded growth by 20 to 30% ; the fur is discolored, and the animals are unkempt. The addition of various vitamins, yeast or protein to an already adequate diet does not prevent these changes.

" 3. The slow growth obtained on suboptimal levels of riboflavin or protein is further decreased by the addition of 40 mg.% atabrine to the diet. With diets suboptimal in vitamin A addition of atabrine does not cause a further reduction in growth rate.

" 4. On the basis of rate of growth on diets containing atabrine, the chick is from three to four times as tolerant of atabrine as is the rat."

ii. When a low-protein, low-choline diet was given to groups of weanling rats, with or without atebrin in doses of 40 mgm. per 100 gm. ration, a high percentage of deaths occurred in the control group, but none in the group receiving the drug. The part played by atebrin has now been examined more fully. The diets used, to which certain vitamins were added, are described in detail, and the drug was incorporated as described above. In the present investigation three of six control rats on a low-protein diet died before the 14th day of the experiment, while those receiving in addition 40 mgm. per cent. of atebrin all survived for this period and showed only slight kidney damage. In another group of rats receiving low-choline diet somewhat similar results were obtained. A large percentage of the controls and those receiving a similar dose of atebrin to the above, had haemorrhagic kidneys, whereas 65 mgm. per cent. of atebrin in the ration gave almost complete protection. The drug appeared to have no lipotropic action. The possible mechanism of its action is discussed. The efficiency of utilization of food was impaired by atebrin in low dietary intakes, as shown by growth curves. *J. D. Fulton.*

RECTOR, N. H. **"Anti-Malaria Ditching by Dynamite."** *J. National Malaria Soc.* Tallahassee, Fla. 1943, v. 2, No. 2, 11–15, 7 figs. on 4 pls. Discussion 15–20 by DORER, R. E. & TAYLOR, J. E.

The blasting of open earth ditches in wet or marshy land has been successfully employed in the United States for a long time. This paper and the discussion it evoked describe clearly how the operation should be carried out in a variety of conditions: they should be of great value to anyone contemplating work of this nature. [A description of the successful application of this method of antimalarial drainage in Palestine was summarized in this *Bulletin* 1938, v. 35, 96.]

Ditching with dynamite is generally the least expensive method for ditching in soft soils or through heavily wooded swamps. About the smallest ditch that can be economically blasted is one two feet deep and three feet wide, and the largest ten feet deep and thirty feet wide. After a right-of-way has been cleared, from 10 to 15 feet wider than the proposed ditch, by the removal of standing timber and logs (it is not necessary to remove stumps), a crew of 3 to 10 men can blast 750 to 3,000 feet of channel in one day. But drainage by dynamite is specialized work and an experienced blaster must supervise the operation. The fuse method should not be used for the detonation of dynamite. An electric blasting machine should be employed; the small pocket-size detonator is recommended. The lead wire from the primed cartridge must be at least 500 feet long. Under ordinary conditions one pound of dynamite is required to move one cubic yard of "soft mucky material."

For detailed information concerning the making of bore holes and loading them with dynamite, the papers should be consulted.

Norman White.

LEGWEN, W. A. **Malaria Control Experience with Circular Joint Ditch Paving Slabs and Automatic Siphons.** *J. National Malaria Soc.* Tallahassee, Fla. 1943, v. 2, No. 2, 61–4, 2 pls.

OLIVIER, L. J. G. **Malaria Control in Practice.** *Pub. Health.* Johannesburg. 1944, Apr., v. 8, No. 3, pp. 5, 7, 9, 11, 13.

SEELER, A. O., OTT, W. H. & GUNDEL, Mary E. **Effect of Biotin Deficiency on the Course of *Plasmodium lophurae* Infection in Chicks.** *Proc. Soc. Exper. Biol. & Med.* 1944, Feb., v. 55, No. 2, 107–9, 1 fig.

In a recent publication TRAGER reported experiments indicating that certain malarial infections of birds were intensified by withholding biotin from the diet [this *Bulletin*, 1943, v. 40, 676]. The authors of the present note are able to confirm these observations as a result of experiments on chicks infected with *Plasmodium lophurae*. Chicks on a biotin-free diet, and showing signs of biotin deficiency developed infections which at the peak were twice as heavy as in control chicks kept on an adequate diet. *C. M. Wenyon.*

TAYLOR, F. H. **The Intermediary Hosts of Malaria in the Netherlands Indies.**

This book is reviewed on p. 698.

BLACKWATER FEVER.

FOY, H., GLUCKMAN, J. & KONDI, Athena. **Pigment Metabolism and Renal Failure in Acute Sulphonamide Haemolysis resembling Blackwater Fever.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1944, Mar., v. 37, No. 5, 303–19, 3 graphs & 2 figs. on 1 pl. [44 refs.]

Detailed clinical and laboratory findings are given of a case of an acute massive intravascular haemolysis which followed the administration of benzyl-sulphanilamide. There were oxyhaemoglobinaemia, methaemalbuminaemia, haemobilirubinaemia and intracorpuscular methaemoglobinaemia, with a profound fall in the red cell count; terminally the patient became anuric and azotaemic, and died. The almost complete anuria was not associated with blockage of the renal tubules with precipitated products of haemoglobin; there were, however, changes in both the tubules and the glomeruli, such as are characteristic in blackwater fever and incompatible transfusions.

Recent spectroscopic work has established that in toxic haemolysis due to sulphonamide drugs, intracorpuscular methaemoglobin, plasma oxyhaemoglobin, methaemalbumin and haemobilirubin are all present, and that the urine may contain either or both oxyhaemoglobin and methaemoglobin. A much rarer pigment is sulphaemoglobin.

Plasma oxyhaemoglobin, methaemalbumin and haemobilirubin are common to all intravascular haemolyses but a point of considerable interest is the presence of intracorpuscular methaemoglobin in sulphonamide toxic haemolysis and its absence, so far as is known, in blackwater fever; in other intravascular haemolysis nothing is known concerning its presence or absence. Methaemoglobin is an oxidation product of haemoglobin, the iron moiety being converted from the divalent to the trivalent state. A number of substances, not oxidizing agents, such as aniline, acetanilide, plasmoquine [this *Bulletin*, 1939, v. 36, 122], nitrobenzene and sulphonamides, also produce methaemoglobinaemia. In the case of aniline and acetanilide the production of *p*. aminophenol and its derivatives, such as quinoneimine, have been

shown to be responsible for the production of methaemoglobin. It has been suggested that *p*-aminophenal and semiquinones may play a part in the oxidation of haemoglobin to methaemoglobin by sulphonamides, and it has been stated that following the administration of sulphonamides the urine may contain *p*. aminophenol, but it may be remarked that the tests used for the detection of the latter substance are not specific. Methaemoglobincythaemia is less serious than sulphaemoglobincythaemia since the former reverts to oxyhaemoglobin in a few days and this change can be accelerated by reduction with such agents as methylene blue or ascorbic acid.

The methaemoglobin of the urine is not derived from the plasma methaemalbumin or intracorpuscular methaemoglobin, nor is its formation entirely dependent upon the urinary *p*H or ionic concentration; it may be noted that urochrome and certain other urinary pigments will convert haemoglobin into methaemoglobin *in vitro* in the absence of oxygen.

The renal failure that occurs in blackwater fever, incompatible transfusions, crush injuries, utero-placental damage and severe vomiting, as well as in sulphonamide poisoning and excluding in the latter those due to mechanical blockage by crystalline derivatives of the drugs, cannot, as in the present case, be explained simply as the result of blockage of the renal tubules by products of haemoglobin precipitated from an acid urine. Recent work indicates that many factors may be involved, including diminished glomerular filtration following dehydration, actual or physiological, disturbances in acid-base-electrolyte-water balance, and upsets in the permeability of the glomerular membrane. Reduction in blood flow might specially affect the tubules because of their high oxygen requirements and lead to degenerative changes, with disturbance of tubular reabsorption and concentration [this *Bulletin*, 1943, v. 40, 363].

In the present case the outstanding feature in the kidney was the wide separation of the tubules by intensely oedematous tissue, in which the reticular fibres were unusually obvious. Lying in the oedematous mass were pools of coagulated lymph and focal aggregation of plasma cells, especially marked in the region of the large calices. The oedema nowhere tended to compress the tubule. In the proximal convoluted tubules the epithelium was degenerated, and the nuclei irregular, and of bizarre shapes. In many areas desquamated cells from the convoluted tubules were seen to be lying free in dilated tubules, surrounded by eosinophilic débris; in such tubules the basement membrance was thick and opaque. The majority of the glomerular tufts with their epithelium, and capsular spaces, appeared normal. There was a great difference in the histological appearances of the kidney tubules and glomeruli in the paraffin and frozen material. In the paraffin sections the sub-capsular spaces and glomerular tufts appeared normal and the tubules much dilated, with débris suspended freely in the lumina. In the frozen material, on the other hand, the capsular spaces were almost non-existent, and the glomerular tufts filled almost the whole of the space. The tubules were less dilated, and the débris in them, although loosely disposed, occupied a much greater proportion of the lumen than in the paraffin section. It is suggested that the distortion brought about by the dehydration consequent upon the paraffin method makes this technique unsatisfactory for correctly assessing the changes that take place in these delicate structures in the anuric condition.

A great increase in the osmotic resistance of the red cells to saline, and to lyso-lecithin, was found, but it was not associated with any changes in the cell volumes, thicknesses, diameters or ratios, and the Price-Jones curve was within normal range. It was thought that changes in the cells' environment, perhaps in the nature of circulating haemolysins, might be more important than physical changes in the structure of the red cells, rendering them more susceptible to destruction.

F. Murgatroyd.

TRYPANOSOMIASIS.

WEINMAN, D. **Cultivation of *Trypanosoma gambiense in vitro* in Cell-Free Medium.** *Proc. Soc. Exper. Biol. & Med.* 1944, Jan., v. 55, No. 1, 82–3.

Referring to the work of BRUTSAERT and HENRARD [this *Bulletin*, 1937, v. 34, 530; 1938, v. 35, 704], the author records his method of cultivating *Trypanosoma gambiense.* The culture medium was a modification of the Leptospira medium used by NOGUCHI and BATTISTINI (*J. Exper. Med.*, 1926, v. 34, 851) [this *Bulletin*, 1926, v. 23, 738] for the cultivation of *Bartonella bacilliformis*; it had the following composition :—

Solution A.—Sodium chloride, 8 gm., nutrient agar (1·5 per cent., Difco), 4 gm., distilled water to 900 cc.

Solution B.—Citrated human plasma, 100 cc., human haemoglobin (Blood 1 part, distilled water 3 parts), 20 cc.

A is autoclaved and B added later. The medium is dispensed in test tubes provided with rubber stoppers. The final *p*H is 7·4–7·5.

Cultures are incubated at 26°–28°C. and "become positive 7–10 days after inoculation, even when the original inoculum contains no microscopically demonstrable trypanosomes, but the tubes should not be discarded until after one month." The trypanosomes have lived in this medium for periods up to 71 days and cultures have been maintained by numerous transfers for 127 days. [Brutsaert and Henrard found the cultivation of trypanosomes an effective method for the diagnosis of scanty infections; it seems that it might be useful in an investigation of the incidence of inapparent infections of man with *T. gambiense* and *T. rhodesiense.* See also this *Bulletin*, 1930, v. 27, 244; 1935, v. 32, 34.]

J. F. Corson.

ACRES, I. S. **The Treatment of Sleeping Sickness.** *Med. Press & Circular.* 1944, May 3, 278–81.

A general account.

i. NASH, T. A. M. **The Control of Sleeping Sickness in the Raphia Pole Trade.** *Bull. Entom. Res.* 1944, Apr., v. 35, Pt. 1, 49.

ii. ——. **A Low Density of Tsetse Flies associated with a High Incidence of Sleeping Sickness.** *Ibid.* 51.

To understand the transmission of sleeping sickness, or to control it, one must know the ecology of the villager as well as of the fly. Nothing could illustrate the principle better than these notes.

i. In most parts of Northern Nigeria *Glossina tachinoides* is localized to stream banks, and may be controlled by clearing bush. Some

streams are choked by the palm *Raphia* which makes conditions very suitable to this fly. The villager needs the palm, for its straight, light mid-ribs are excellent for roofing, and cutting these poles is an important village industry. Pole cutters are therefore in close and repeated contact with *G. tachinoides*. In order to reduce risk of transmission of trypanosomiasis, a law has been made to limit pole cutting to the first 14 days of each three monthly period. This (if observed) will stop transmission and protect the men, for it allows a whole generation of flies to die out between the periods when the men are in contact with them.

ii. In the same part of the world streams become dry, except for rare water holes. Tsetse flies tend to be concentrated at the water-holes, and just here there is a close contact of man and fly. This becomes still closer if water is really scarce, for the villager must dig in the stream-bed, and the woman has to sit and scoop up small quantities of water into her calabash : there may moreover be other women, waiting and gossiping, and being bitten.

In a particular place, Nash failed to find any *G. palpalis* in some miles of stream-bed, except at such a water-hole, where he caught four. At this village a very high rate of sleeping sickness (70 per cent. of 43 people) had been demonstrated.

In the author's experience this is not an isolated case. At the end of the dry season fly and man are driven into close contact at water-holes, and it is probable that a few flies may become infected and transmit the trypanosome to a number of people. *P. A. Buxton.*

QUETGLAS, A. & MARTORELLI, J. La enfermedad de Chagas en el sur de Cordoba. [**Chagas's Disease in South Córdoba.**] *El Dia Médico*. Buenos Aires. 1943, Aug. 16, v. 15, No. 33, 914–15, 7 figs.

The authors have written this paper with two objects in view : first, to record the existence of Chagas's disease in a part of the country where its presence has been denied, and, second, to acquaint their colleagues with the main features of the disease, its cause, symptomatology, diagnosis and treatment. These are all plainly and simply stated, but among the methods of diagnosis is biopsy examination of the myocardium, a proceeding which their colleagues would be wiser to avoid. Details of three cases are given in the form of a table, the patients being a boy of 10½, a girl of 16 and a man of 21 years. Photographs showing oedema of the lids, and a series of electrocardiograms are reproduced. *H. Harold Scott.*

LEISHMANIASIS.

SOMERS, R. B. U. **Kala Azar treated with 4 : 4′ Diamidino-stilbene.** *Lancet.* 1944, Apr. 22, 531–3.

The author states that in the last eight years he has treated 26 cases of kala azar in the Sudan. The first 21 were treated with antimony tartrate or neostibosan, and the patients either died in hospital or ran away before completing their course. The last five cases, the subject of this paper, were treated with diamidino-stilbene, and they all responded favourably. They had had some previous treatment before admission to hospital under the care of the author, who was only

responsible for the final two courses in cases 1 to 4, and the final course in case 5. The drug was administered intravenously at intervals of one to three days, the initial dose being 1·1 mgm. per kgm. of body weight. The dose was increased gradually to 3·5–4·0 mgm. per kgm.

The first patient had received four courses of sodium antimony tartrate, in which a total of 175 grains was administered without provoking any response. He was then admitted to hospital and given, during 53 days, a course of diamidino stilbene (2·87 gm.), followed four months later by a second course (1·32 gm.). The second case was complicated by severe scorbutic and septic lesions in the mouth. These responded to ascorbic acid and sulphapyridine. Two courses of diamidino stilbene (2·23 and 0·78 gm.) were given, with an interval of about one month. The third patient, previously treated with the antimonial anthiomaline, was given two courses of diamidino stilbene (2·48 and 1·6 gm.) with an interval of about three months. The fourth case, previously treated with sodium antimony tartrate, was given two courses of stilbene (2·75 and 2·18 gm.) with a three weeks' interval. The fifth patient, who had already had three courses of 15 daily injections of 50 mgm. of diamidino stilbene with intervals of nine days between the courses, relapsed a month after the last course. He was then treated with antimony tartrate (27·5 grains). In spite of this treatment he was dangerously ill when admitted to hospital. He had a large buccal ulcer and a swollen parotid gland. These were cured with sulphapyridine and vitamin C. He was then given a course of 31 injections of diamidino stilbene (4·35 gm.). It is concluded that if six months' good health and continued improvement can be taken as a sign of cure, it is safe to regard the first four patients as cured. The fifth is still under observation, as after four months the blood is still abnormal. As regards reactions to the drug, all five showed these in one form or another—breathlessness, headache, dizziness, feeling of emptiness in the chest, vomiting, epistaxis. *C. M. Wenyon.*

GIL BERMÚDEZ, A. La moderna terapéutica del kala azar infantil. [**The Modern Therapy of Infantile Kala Azar.**] *Med. Española.* 1943, Sept., v. 10, No. 56, 301–14, 3 figs. [Bibliography.]

In this paper is described the successful treatment in Spain of 15 cases of kala azar in children varying in age from 6 months to 9 years with solustibosan in concentrated aqueous solution or oily suspension, as already noted by KIKUTH and SCHMIDT [this *Bulletin*, 1944, v. 41, 194]. The water solution is five times the usual strength, 1 cc. representing 0·1 gm. of pentavalent antimony, while the suspension in oil is such that 1 cc. represents 0·054 gm. of pentavalent antimony. The concentrated watery solution was administered intramuscularly in daily doses for 10 days, the full course being 1 cc. per kgm. of body weight. In some cases such a course did not effect a cure, and it was followed up by a course of six intramuscular injections of the oily suspension administered on alternate days, the total quantity given representing 2 cc. for each kgm. of body weight. In some of the cases a single course of the oily suspension was found to be sufficient to effect a cure, while in others two such courses were required. Both the preparations were of low toxicity and were well tolerated, there being neither local nor general reactions. In certain cases the condition of the patient demanded blood transfusion, while to all injections of vitamin C and

liver extract were given. The author concludes that the two preparations, particularly the oily suspension represent a marked advance in the therapeutics of infantile kala azar. *C. M. Wenyon.*

McCord, C. P. **American Leishmaniasis (Jungle Ulcer). A Tropical Occupational Disease.** *Indust. Med.* Chicago. 1939, July, v. 8, No. 7, 269–84, 9 figs. (1 map). [Bibliographies.]

The industry of gum collection in the Yucatan Peninsula affords employment for some 13,000 chicleros, foremen and others who produce an annual output of some 10,000,000 pounds of chicle [gum of the sapodilla tree]. It is only during the six months' rainy season, June to November inclusive, that the latex flows in the trees, and it is then that the chicleros with their families form camps near the jungles in which the trees grow. Only the chicleros enter the jungle to tap the trees, and it is they who are most liable to cutaneous leishmaniasis. The present article is a general account of the industry and the mode of life of the chicleros, and a dissertation on the subject of the various forms of leishmaniasis, particularly those which have been described from South and Central America. As regards the type occurring amongst the chicleros, the information given is very similar to that in a paper by Beltran and Bustamante [this *Bulletin*, 1943, v. 40, 441]. The object of the article is to show that the cutaneous leishmaniasis of the chicleros, or jungle ulcer as it is termed, is actually an occupational disease, about the actual method of transmission of which there is no precise information. *C. M. Wenyon.*

FEVERS OF THE TYPHUS GROUP.

Zironi, A. Ueber die Bedeutung der Proteus X-Infektionen bei Rickettsiosen. [**The Significance of** *Proteus X* **Infections in Rickettsial Diseases.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Dec. 11, v. 104, No. 2/5, 107–18.

After a detailed review of the literature of the subject the author discusses the significance of the frequent occurrence of *Proteus X19* in the blood of typhus patients during the early stages of the fever. His view is that the organism is a mutation form of *Proteus vulgaris*; he believes that the change in the type of the organism is brought about by the action of the antigen common to *Rickettsia prowazeki* and *Pr. X19*, and that it is analogous with the mutation that occurs in strains of pneumococci when they acquire the characteristics of other strains which have been brought into contact with them in the form of killed cultures either in the test tube or in the human body.

The antigen common to *R. prowazeki* and *Pr. X19* is produced by the former organism when it invades the human body so that it inhibits the action of the antibodies which normally prevent the *Proteus* organisms from invading the blood stream. In this way the typhus infection causes a condition of increased susceptibility to *Pr. vulgaris* as well as the change in type mentioned above.

Many examples are quoted of infections which cause an increase in the susceptibility of the body to other organisms, for example the virus of influenza arouses the bacillus of Pfeiffer to activity, and other viruses have corresponding actions on special bacteria.

The author has already suggested in 1941 that the antigen which *Proteus X* has in common with *R. prowazeki* may serve as a source of vaccine against typhus fever. He goes still further and suggests that if it should be possible to transform the *Proteus X* antigen into a hapten this could be given intravenously as a valuable therapeutic agent and he claims that already he has had good results from this "haptentherapy" in typhoid fever, brucellosis, and staphylococcus infection. No experimental work is described in this paper.

John W. D. Megaw.

BARTH, C. Weiterer Beitrag zur Frage des *Bac. proteus X19* bei experimentellem Fleckfieber. 2. Mitteilung. [**A Further Note on** *Proteus X19* **in Experimental Typhus Fever.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Dec. 11, v. 104, No. 2/5, 227–37. [13 refs.]

The author had already shown that a special strain of Proteus (*Pr. X19 B*) immunized guineapigs against typhus fever.

He later gave subcutaneous injections of killed vaccines made from this strain to two persons, and after an interval of two months inoculated these persons with 5 cc. of blood from a patient at the height of an attack of typhus fever. In each case there was a short febrile attack lasting two days after an incubation period of nine days. After vaccination, and also after the febrile attack, the Weil-Felix titre did not rise above 1–50.

Six other persons were vaccinated with larger doses, and again the titre with O and H strains of *X19* was low, but it rose to 1–200 with the homologous strain, *X19 B*. These persons were later inoculated with blood from typhus patients, and only one of them had an attack; this was typical, lasting 16 days after an incubation period of 14 days; the *OX19* titre did not exceed 1–100.

Various neutralization tests were carried out with the sera of these persons after vaccination. Three men were inoculated with a mixture of infective material and varying doses of the sera. The person who was given the largest dose of serum had no reaction, the other two had high fever lasting two days and beginning on the third day after inoculation.

From these and other neutralization tests in animals it is claimed that genuine immunity is caused by the vaccine in 75 per cent. of the subjects.

The author suggests that this method of vaccination should be tried in places where typhus fever occurs either in endemic or epidemic form.

Details of the various experiments are not given, and the results are stated in general terms. [For a reference to FELIX's work on vaccination of animals with *Proteus OX19*, see this *Bulletin*, 1943, v. 40, 230.]

John W. D. Megaw.

EYER, H. & DILLENBERG, H. Die Serodiagnostik des Fleckfiebers. Eine Vergleichende Untersuchung. [**The Serum Diagnosis of Typhus Fever.**] *Ztschr. f. Hyg. u. Infektionskr.* 1943, Nov. 20, v. 125, No. 3/4, 308–30, 3 figs. [14 refs.]

The findings in more than 4,000 comparative tests with the Weil-Felix and Rickettsia-agglutination reactions are analysed and discussed in this paper. These tests will be referred to as the "W.-F." and "R.-A." tests in the following summary.

The results obtained in healthy unvaccinated, and healthy recently vaccinated, persons with no history of attacks of typhus fever are given in the table below. The figures are percentages in each case.

	Healthy unvaccinated		Healthy vaccinated (with Weigl's vaccine 1 to 6 months previously)	
	Germans	Poles	Germans	Poles
W.-F. Titres				
0	43	27	35	16
1–20 to 1–160 (non-specific)	56	69	47	52
1–320 (suspicious) ...	1	3	10	22
Over 1–320 (positive) ...	0	1	8	10
R.-A. Titres				
0	69	43	3	12
1–20 to 1–80 (non-specific)...	30	54	24	50
1–160 (suspicious) ...	1	2	42	28
Over 1–160 (positive) ...	0	1	31	10

The reactions of 21 healthy Poles were tested before and after vaccination with Weigl's vaccine ; the rise in the R.-A. titre was more uniform and persistent than that of the W.-F. titre, though on the whole the responses to the two tests were rather uniform. Titres of 1–160 or over were found in 14 with the W.-F. test, and in 17 with the R.-A. test.

Persons who had been hyperimmunized by repeated large doses of vaccine, and then had continuously been bitten by infected lice in the preparation of Weigl's vaccine, reacted in surprisingly low titres to both tests. The titres were lowest in those who had been employed for long periods in this occupation. Those who suffered from attacks of typhus fever while so employed showed only moderate rises in the titres with both tests in most cases.

The latest titres observed in 19 persons in whom hyperimmunity had been established beyond doubt in the above ways were :—

	Negative	1–10 to 1–40	1–80 to 1–160	1–320
R.-A. ...	3	15	1	—
W.-F. ...	1	8	8	2

In a large series of cases of typhus fever in persons who had not been vaccinated the percentages of significant reactions (R.-A., 1-160 and W.-F., 1–320) on different days of the disease were as follows :—

Day of Fever	3	4	5	6	7	8	9	10	11	12	13	14
W.-F. ...	4	14	26	52	66	91	96	90	83	90	76	91
R.-A. ...	27	49	69	86	96	94	98	100	95	100	100	100

[Low-titre reactions with *Pr. OX19*, whose significance has been stressed by FELIX, when they follow negative or lower titre reactions, have not been taken into account by the authors.]

In typhus patients who had been vaccinated the reactions were irregular, later in appearing, and of lower titres; with the W.-F. test "doubtful reactions" (titre less than 1–320) tended to preponderate, whereas the R.-A. titres always became significant and so were more reliable in diagnosis.

Non-specific positives, such as occur with the Weil-Felix test in such conditions as bowel diseases and jaundice, were never observed with the R.A. test, and the authors claim that a positive R.-A. reaction never occurs in persons who have not, at some time, been in contact with *R. prowazeki.*

They also claim that a persistently negative R.-A. reaction has never been observed in any case of proven typhus fever.

John W. D. Megaw.

RUBINSTEIN, B. N., SACHAROVA, P. I. & YAKOVLEVA, E. S. [**The Use of the Agglutination Phenomenon in the Early Diagnosis of Typhus. I. Communication. The Stimulation of the Formation of Agglutinin in Typhus.**] *Klinicheskaia Meditsina.* Moscow. 1943, v. 21, No. 6, 65–7. [In Russian.]

As the Weil-Felix reaction is very seldom positive before the 5th or 6th day of the disease, the authors have experimented with an intramuscular injection of lactine (or 2 cc. of milk) to raise the titre of the agglutination. A total of 60 cases were observed; 45 with typhus and 15 with other diseases, such as influenza, malaria and pneumonia. Out of 45 typhus cases the titre of the Weil-Felix reaction, after an injection of milk, was raised in 27 cases and remained unchanged in 18; in all the 15 control cases the titre of the reaction was unchanged, which shows the rôle of a specific factor in the dynamics of the Weil-Felix reaction. To give an example: On the 5th day of the illness a patient, who showed all clinical features of typhus but whose Weil-Felix reaction was negative, received 2 cc. of milk. A sample of blood, which was withdrawn six hours after the injection proved positive (titre 1 : 200) and the sample of blood withdrawn 12 hours after the injection also positive (titre 1 : 800). In some cases which showed a negative reaction on the 6th, 7th or even after the 9th day of the illness an injection of milk turned the negative reaction into a positive one within 6 or 12 hours. The question of the mechanism of this rise in the titre remains very obscure. *H. W. Swann.*

WERTMAN, K. & PLOTZ, H. **Presence of Typhus Antibodies in Commercial Frozen and Dried Complement.** *Proc. Soc. Exper. Biol. & Med.* 1944, Jan., v. 55, No. 1, 29–31.

In a series of complement-fixation tests for epidemic typhus in which commercial complement was being used the authors found some positive reactions in sera known to be negative.

By a series of tests it was found that some commercial complements contained specific epidemic-typhus antibodies.

One of the manufacturers concerned admitted that the complement might have been prepared from guineapigs that had been used in tests for epidemic-typhus vaccine.

Complement of unknown origin should be tested for the presence of specific antibodies. *John W. D. Megaw.*

KUDICKE, R. Die Bedeutung von Empfänglichkeit, natürlicher Resistenz und erworbener Immunität in der Epidemiologie des Fleckfiebers. [**The Significance of Susceptibility, Natural Resistance, and Acquired Immunity in the Epidemiology of Typhus Fever.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Dec. 11, v. 104, No. 2/5, 283–97, 3 figs. [12 refs.]

The author discusses some of the factors concerned in causing variations in the epidemiological features of typhus fever.

He believes that the apparent infrequency of the disease in young children is not due to immunity against infection but to resistance by which the attack is modified. He holds that a close investigation for the detection of mild cases will show that children are attacked just as frequently as persons of the older age groups. One example is quoted of an epidemic in which 29 per cent. of the attacks were in children under 10 years of age. These attacks differ in type from those occurring in older persons who are partly immune.

Further investigation is needed to determine whether the blood of children and others suffering from mild attacks is infective to lice.

The seasonal incidence of the disease usually conforms to the well-recognized pattern, but in highly susceptible communities there may be epidemics in summer. One example was the epidemic in East Europe in 1941–43: in this the number of attacks increased progressively from the early months of 1941, reaching the peak in January 1942, and then following the usual course. Even when the seasonal curve of a widespread epidemic is normal there are often localities in which the incidence is greatest in summer. *John W. D. Megaw.*

BREVDO, B. S. [**Localization of the Initial Rashes in Typhus.**] *Sovetskaia Meditsina.* Moscow. 1943, No. 11/12, 15–16. [In Russian.]

Early diagnosis of typhus is still very difficult. The Weil-Felix reaction is positive only in 75 per cent. of cases by the fifth day of illness. The use of autohaemotherapy, milk injections, etc., for the purpose of inducing a positive Weil-Felix reaction has not proved very successful. The cardinal feature of the disease is the appearance of an initial rash, associated with other symptoms and signs, such as high temperature, flushed face, nervous symptoms, etc. The use of mechanical factors (tourniquet, hot baths, cupping) to accentuate the rash has not proved satisfactory. The author strongly recommends that a thorough examination should always be made of the whole surface of the body in suspected cases, and not only of the typical sites of the initial rash. Occasionally, a few single haemorrhagic areas appear in the region of the sacrum and the buttocks, or on the back around the scapulae. These eruptions are sometimes observed 24 hours before the typical places are affected, and their appearance is due to an early trauma of the tissues through constant lying on the back. Other diseases (scurvy, haemorrhagic diathesis) may produce similar skin lesions. In cases where these eruptions do occur round the sacrum or the scapulae, typhus can often be diagnosed on the third or fourth day, about 24 hours before the Weil-Felix reaction is likely to be positive.

H. W. Swann.

BREVDO, B. C. [**The Symptomatology of Atypical Forms of Typhus.**] *Klinicheskaia Meditsina.* Moscow. 1943, v. 21, No. 6, 58–65. [In Russian.]

Atypical clinical forms of typhus have often been reported and the variability of the disease is shown by a corresponding varying mortality (5–50 per cent.) in different epidemics.

The four cardinal distinctive features of the disease are : (1) the rash ; (2) the typical temperature curve ; (3) nervous symptoms ; (4) the Weil-Felix reaction. Absence of a rash is not rare (4·5 per cent.) ; the temperature curve varies considerably but afebrile cases are uncommon and are clinically severe ; disturbances of the central nervous system are very constant but occasionally they are absent. In atypical cases a correct diagnosis depends on the Weil-Felix reaction, which is positive in at least 95 per cent. The actual titre is less important than an increasing titre during the course of the illness. The reaction may be delayed in atypical cases, even until convalescence, and in a few cases it has been negative. The condition of the tongue, the pulse, the blood pressure, leucocytosis and enlargement of the spleen, are important aids to an early diagnosis. *H. W. Swann.*

HOFF, F. Agranulozytose bei Fleckfieber. [**Agranulocytosis in Typhus Fever.**] *Wien. klin. Woch.* 1943, Dec. 17, v. 56, No. 49/50, 709–10, 1 fig.

A girl aged 16 admitted to hospital about the 12th day of an attack of typhus fever was found to be suffering from agranulocytosis.

The total leucocyte count fell as low as 700 per cmm., and the granulocytes were 4 per cent.

The Weil-Felix reaction was tested on two occasions and titres of 1–160 and 1–1,200 were observed.

After a prolonged and very severe illness, complicated also by pneumonia, the patient made a good recovery.

Eubasinum (sulphapyridine) was given for the pneumonia, and apparently did not interfere with the steady improvement in the agranulocytosis.

Two blood transfusions were given ; according to the chart it appears that the granulocytes had already trebled in number before the first of these. The author does not know of any previous report of agranulocytosis as a complication of typhus fever.

John W. D. Megaw.

SECRET, E. Traitement abortif du typhus exanthématique par l'immunothérapie précoce. [**Abortive Treatment of Exanthematic Typhus by Early Immunizing Therapy.**] *Maroc-Méd.* 1944, Jan., v. 23, No. 241, 8–13.

In 1942 the author administered the total blood of typhus convalescents to persons exposed to special risk of infection. The success of this procedure suggested to him that convalescent blood might be effective in treatment if given at the onset of the attack.

In 10 patients he aborted the attack by injecting 10 cc. of convalescent blood on each of two consecutive days immediately after the onset. In the 11th case the disease was aborted for three days, but the fever returned and the patient had a typical attack lasting 14 days.

Then the treatment was changed to the following ; 15 cc. convalescent. blood intravenously, and 40 cc. intramuscularly, combined with 20 cc. convalescent serum subcutaneously, on each of two consecutive days ; on the following day the intravenous dose was omitted, and on the succeeding six days convalescent serum alone was given intravenously in doses gradually diminishing from 30 cc. to 5 cc.

The diagnosis was confirmed by the occurrence of a Weil-Felix reaction in rising titre. This was not due to the injections because the reaction remained negative in control healthy persons who were given varying doses of convalescent blood or serum.

Other possible fallacies are discussed, and the author claims that the disease can be aborted with certainty by the above line of treatment if it is started within one or two days of the onset. He is also satisfied that there is no danger of transmitting the disease to persons who have been wrongly diagnosed [but the case of failure mentioned above raises this question, and it would hardly be safe to assume that the blood of persons in the 8th or 9th day of convalescence is always free from infectivity]. *John W. D. Megaw.*

KILLIAN, H. & OBERTREIS, E. Chirurgie und Flecktyphus. [**Surgery in Typhus Fever.**] *Deut. Ztschr. f. Chirurgie.* 1943, Nov. 10, v. 258, No. 6/8, 445–67.

On the Eastern Front during the winter of 1941–42, about 6 to 8 per cent. of the typhus patients had surgical complications, though most of these were mild. At the height of the epidemic, the fatality rate was 18 to 20 per cent. in cases without surgical complications ; among the patients treated in the surgical units it was 11 or 12 per cent.

Surgical complications are of two main types ; non-specific septic conditions, and lesions caused by the Rickettsiae, chiefly in the small arteries.

Some of the septic conditions were as follows. Carbuncle and erysipelas occurred chiefly in the third and fourth weeks. Abscesses occurred in many parts of the body ; half of these were attributed to septic metastases ; they were often multiple and were specially common in association with necrosis of the skin. Parotitis occurred in only 1 per cent. of all the cases of typhus ; of 17 cases with suppuration, 13 needed operation, and three of these were fatal in spite of sulphonamide treatment.

Septic pneumonia, also abscess and gangrene of the lung, were usually fatal ; they were secondary to septic conditions of the larynx and trachea, which are more common than is generally recognized. Special efforts should be made to control them by mild antiseptic sprays or inhalations.

Only a few cases of otitis media and mastoiditis were seen ; these were often secondary to pre-existing infections, which were lighted up by the disease.

Severe empyema was almost as common as parotitis ; drainage with resection of a rib was the usual treatment ; there were two deaths among 15 cases.

The complications associated with vascular lesions are described as being of the nature of "necrotic thrombo-vasculitis" ; they are caused by the formation of nodules in and round the vessels, especially those of the skin and central nervous system.

Haemorrhages of varying degree were frequent. Necrosis is due chiefly to lesions in the small vessels; the pulse in the larger arteries of the affected parts was usually palpable. There were 18 cases of peripheral infarcts or severe necrosis and gangrene, but mild lesions associated with pains and sensory disturbances were common.

When the larger vessels were affected, the lesions were usually thrombotic or embolic; about half of these were in the lower extremity.

There were eight cases of amputation for gangrene of the foot, which occurred during the second or third week, and was heralded by intermittent pains and a spotty blue-grey staining of the skin. The onset was often insidious, so that the diagnosis was liable to be delayed.

Emboli and thrombi were occasionally found in the largest arteries, even in the aorta. The incidence of thrombosis was 0·3 per cent., and of severe gangrene 0·1 per cent.

The occurrence of typhus as a complication of surgical conditions was common, and diagnosis might be very difficult.

Special attention is called to the possibility that the blood in typhus fever may be infective up to eight days after defervescence. "Smear infection" through the mucous membranes and skin must be taken into account by surgeons during epidemics.

Although experienced Russian surgeons insist that persons who have had attacks of typhus are bad subjects for operations up to about four months after defervescence, the authors have not found that the healing of wounds has been specially delayed or that wound infections have greatly increased during convalescence.

Disinfestation under plaster bandages is a difficult problem; the bandages need not be removed for this purpose if the patient has been away from the infected region for 8 to 10 days.

Amputation for gangrene should be delayed, except in cases of moist gangrene with alarming symptoms.

Convalescent serum is useful for restless and delirious patients with typhus.

In some cases, appendicitis and ileus have been simulated.

The above are only a few of the points dealt with in this comprehensive study of the subject. *John W. D. Megaw.*

Otto, R. & May, K. H. Zur Frage der experimentellen Wertbestimmung von Fleckfieber-Impfstoffen. [**Experimental Estimation of the Efficacy of Typhus Vaccines.**] *Ztschr. f. Hyg. u. Infektionskr.* 1943, Nov. 20, v. 125, No. 3/4, 299–307. [45 refs.]

Curious variations were found in the degree of immunity produced by similar doses of egg-yolk vaccine administered by different routes. With certain lots of vaccine the results were better after subcutaneous injections, with others the intraperitoneal route was more effective. In most of the tests the number of guineapigs inoculated was four or five by each route. Some lots of vaccine gave complete protection by both routes; one lot gave poor results by both.

Egg-yolk vaccine prepared in America gave excellent protection against the Cracow strain of Rickettsia; so did Giroud's lung vaccine and two types of louse vaccine.

In preparing their vaccine the authors do not use strains of Rickettsiae that have been passaged more than 50 times through egg-yolk.

They find guineapigs the most suitable animals for testing the vaccines ; mice are more difficult to immunize, and many of them died of intercurrent infections.

The titre of agglutination of Rickettsiae in vaccinated animals was not found to have a uniform relationship to the immunizing power of different vaccines. The relationship of Giroud's dermal reaction to the degree of immunity has still to be proved. *John W. D. Megaw.*

DAVID, W. A. L. **Fumigation as a Method of controlling the Body Louse** *Pediculus humanus corporis*, **de Geer. Parts I and II.** *Bull. Entom. Res.* 1944, Apr., v. 35, Pt. 1, 79–89, 2 figs. [20 refs.] [Summary appears also in *Bulletin of Hygiene.*]

In the epidemics of louse-borne disease during and after the war of 1914–18, hydrogen cyanide was the most widely used of fumigants for delousing. In spite of its high toxicity to lice and good penetration, its poisonous nature and lack of warning odour render it very unsatisfactory for this use. A search for alternatives therefore seemed advisable.

Part I of this paper describes a laboratory method for determining the toxicity of liquid or gaseous fumigants to small insects like the body louse. The apparatus has the advantages of maintaining good control over physical conditions while being fairly simple to construct.

Part II gives a rough guide of the toxicity to lice, of 20 substances selected as possible fumigants for delousing, based on experiments with the apparatus described. In addition, information is tabulated on the following points :—boiling point, specific heat of evaporation, saturation concentration in air, inflammability, type of package, availability, odour, warning properties, and toxicity to man. Considering all these factors, the following compounds were considered promising and selected for practical tests :—methyl formate, ethyl formate, methyl allyl chloride, trichlor-acetonitrile, ethylene dichloride and chloropicrin. The practical tests will be published soon. *J. R. Busvine.*

BERGE, C., AUDOYE, H. & FAUCONNIER, J. Présence du typhus murin dans la région de Ferryville. [**The Occurrence of Murine Typhus in the Neighbourhood of Ferryville (Tunisia).**] *Arch. Inst. Pasteur de Tunis.* 1942. Dec., v. 31, No. 3–4, 185–93, 2 figs. [25 refs.]

Isolated cases of murine typhus, mostly unpublished, have been reported from various parts of Tunisia since 1933 when C. H. NICOLLE and H. SPARROW isolated three strains of murine Rickettsiae from 900 rats, and two strains from 300 mice, in the harbour region of Tunis.

Three cases are now described ; they occurred in August and December 1940, in sailors employed by the harbour administration of the Port on the shore of Lake Bizerta. Rat infestation was intense in the place where the men were working.

The fever lasted 8, 9, and 12 days in the three cases ; only one patient had a rash.

Murine Rickettsiae were isolated from the blood of two of the patients by direct guineapig inoculation. The two guineapigs inoculated with the blood of the third patient on the eighth day of the fever gave no reaction.

In December 1941 and January 1942, 30 rats (*Rattus norvegicus*) were caught in the neighbourhood and murine Rickettsiae were isolated from the pooled brains of two of these by direct guineapig inoculation.

John W. D. Megaw.

SHAPIRO, B. G. **Tick Typhus following a Dog Scratch.** *South African Med. J.* 1944, Mar. 11, v. 18, No. 5, 83–4.

A doctor in charge of a group of prisoners of war near Kokstad [south west of Durban] was vigorously scratched on the left leg by his dog. There was slight bleeding at the time, and 50 hours later there was a rise of temperature to 101°F. with painful lymphadenitis in the left groin. On the sixth day after the injury a maculo-papular rash appeared and soon extended all over the body, including the palms and soles. There was a moderate degree of generalized lymphadenitis, and a necrotic patch resembling a tick bite was found at the site of the scratch. The fever ran a course of 13 days and was typical of tick-bite fever.

Proteus OX19 was agglutinated at a titre of 1–80 on the 12th day, and at 1–160 on the 15th day. *OX2* and *OXK* were not agglutinated at significant titres except for a partial reaction with *OXK* at 1–160 on the 15th day.

[The remarkably short incubation period of 50 hours is reminiscent of similar findings by DING (this *Bulletin*, 1944, v. 41, 116) in his cases of louse-borne typhus in which the patients had obviously been experimentally inoculated with the infective material.]

John W. D. Megaw.

ANIGSTEIN, L., BADER, M. N., YOUNG, G. & NEUBAUER, Dorothea. **Protection against Spotted Fever by Specific Immune Serum inoculated intradermally at the Site of Infection.** *J. Immunology.* 1944, Jan., v. 48, No. 1, 69–77, 9 charts. [11 refs.]

——, ——, —— & ——. **Investigations on Rickettsial Diseases in Texas. Part 3. Spotted Fever: Protection of Laboratory Animals by Intradermal Inoculation of Immune Rabbit Serum.** *Texas Reports on Biol. & Med.* 1943, v. 1, No. 4, 371–88. [11 refs.]

ANIGSTEIN (1936) had already shown that guineapigs could be protected against intradermal inoculation with the infection of louse-borne typhus by infiltrating the skin at the site of the inoculation several hours beforehand with immune serum.

In the present experiments uniform doses of 0·1 cc. of suspensions of [Rocky Mountain] spotted-fever Rickettsiae were injected intradermally and varying doses of immune serum prepared from rabbits were injected into the skin at the same site, either simultaneously or at varying intervals afterwards.

The results are shown in the following table prepared from the information contained in the paper. In all cases the potency of the infecting suspension was checked by using control guineapigs.

In six other guineapigs the infecting suspension was injected simultaneously with, but at a different site from, 0·4 cc. of immune serum and five of the animals showed typical reactions.

Convalescent serum of guineapigs recovered from Texas spotted fever was injected simultaneously, and at the same site, with an infecting dose of suspension but did not prevent attacks in any of the four guineapigs tested.

Dose of immune serum in cc.	Delay in injection of immune serum	Number of guineapigs	Number reacting	Number later found protected
0·4	2 hours	not stated	None	All
0·4	Nil	15	4	4+4
0·1	Nil	3	0	3
0·05	Nil	4	0	4
0·025	Nil	6	0	6 (partial)
0·025	1–18 hours	20	0	17 (all that were available)
0·4	24 hours	5	0	5
0·4	48 hours	4	0	3 (all that were available)
0·4	Till day before onset of fever	3	3	0

The reason for the failure of relatively large doses (0·4 cc.) to give such complete protection as smaller doses is discussed. It was concluded that the antigenic powers of the virus were completely neutralized by the excess of serum; with the smaller doses there was interception of the virus at the site, but a partial escape of the altered virus then caused a symptomless immunizing infection.

This effect was produced by immune serum when it was injected at the site of the inoculation up to 48 hours after giving the infecting dose. After 48 hours a sharp fall will already have occurred in the animal's temperature and this will be followed by a sudden onset of high fever even if immune serum is given during the time that the temperature is subnormal. This fall in temperature is a special feature of intradermal inoculation. It does not occur after intraperitoneal injections of the Rickettsiae.

The immune serum evidently causes a local immunity of the type emphasized by BESREDKA (1928). *John W. D. Megaw.*

ANIGSTEIN, L., BADER, M. N. & YOUNG, G. **Protective Effect of Separate Inoculation of Spotted Fever Virus and Immune Serum by Intradermal Route.** *Science.* 1943, Sept. 24, 285–6.

This is a preliminary note of the work reported above.

ANIGSTEIN, L. & BADER, M. N. **Investigations on Rickettsial Diseases in Texas. Part 4. Experimental Study of Bullis Fever.** *Texas Reports on Biol. & Med.* 1943, v. 1, No. 4, 389–409, 3 charts & 5 figs. (1 coloured).

This paper deals with an investigation into the cause of a new tick-borne fever, first described in August 1943, by WOODLAND, MCDOWELL and RICHARDS, under the name Bullis fever. [See this *Bulletin*, 1944, v. 41, 34, 395.]

The disease occurred at Fort Bullis in Texas among soldiers engaged in military exercises. About 1,000 cases have been observed; 485 of these occurred in May and June 1943.

The fever lasts for 4 to 14 days; there is lymphadenopathy and pronounced leucopenia. In some severe cases a maculo-papular rash is seen. The fatality rate is almost negligible, though some of the attacks are severe. All the patients had been bitten by ticks, and the affected locality was found to be infested with *Amblyomma americanum*, which is a proved vector of spotted fever [American tick-borne typhus] and has been found to be naturally infected with Q fever in Texas.

Rickettsia-like bodies had been found in peritoneal scrapings of guineapigs inoculated with the blood of patients; also in the lymph nodes of patients, and in the organs of laboratory-infected Swiss mice. Guineapigs inoculated with patients' blood had been found to develop low fever for one or two days after an incubation period of 9–11 days.

In the present investigation five lots, of 100 each, of *A. americanum* collected in the affected area were triturated, and a pooled suspension of each lot was used to inoculate six guineapigs.

The febrile responses of the animals were very varied: (*a*) fever for one day after 12 days; (*b*) febrile spells of one or two days, recurring at intervals of three or four days; (*c*) continued high fever; and (*d*) irregular and protracted low fever. In some cases the infection was inapparent. None of the animals died, but the spleen was always enlarged, and in some animals lung conditions were found resembling those seen in experimental spotted fever, typhus, and Q fever.

One strain was passaged 12 times; all the above types of febrile reaction occurred in the guineapigs infected with this strain.

Infection did not immunize guineapigs against spotted fever or Q fever, but did cause immunity against guineapig strains of infection originating from the blood of patients who had Bullis fever.

In Giemsa-stained smears from a guineapig of the fifth passage some large mononuclear cells contained masses of purple-red organisms which were coccoid and bacilliform, and were definitely Rickettsia-like. Similar organisms were seen in other guineapigs.

The findings in guineapigs were very like those caused by infection with mite-borne scrub typhus.

The disease is regarded as a rickettsiosis of which *A. americanum* is the vector, or at any rate one of the vectors.

This very interesting outbreak is of more than local importance: it serves as a warning that when bodies of troops are engaged in operations in areas infested by ticks or mites, outbreaks of Rickettsial fevers transmitted by these arthropods may constitute a serious war risk.

Hitherto these fevers, being transmissible only from lower animals to man and not from man to man, have nearly always occurred as sporadic cases. But the war has introduced a new set of conditions in which large outbreaks can be expected.

In the whole of the Pacific area, and in South-East Asia numerous cases of "scrub fever" (mite-borne typhus) are said to have occurred, sometimes in the form of considerable outbreaks. The fatality rates are said to have been low in most of the outbreaks, but they may sometimes be as high as 10 per cent., and even when they are low the disease is likely to be of serious military importance.

The example of Bullis fever shows that the same kind of thing can happen in tick-infested areas, of which there are many in India, Africa, and America.

In the mite-borne fever the duration of the attacks—seldom less than eight days—and the high-titre agglutination of *Proteus OXK*, point to the correct diagnosis, but the example of Bullis fever shows that some of the tick-borne Rickettsial fevers may closely resemble dengue, in being usually of 3–7 days' duration, in giving a negative reaction with the *Proteus* organisms, in the pronounced leucopenia, and in the negligible mortality.

Indeed, prior to the announcement of the discovery of the Rickettsia, these features suggested to the reviewer that Bullis fever might be a tick-borne zootic fever belonging to the dengue group.

Pending further investigation of these fevers the important point is that medical officers should realize the risks that are run by troops operating in areas infested by ticks and mites.

The only precautions generally available at present are protective clothing and the use of repellents on the parts of the body exposed to bites.

In the case of ticks, frequent search for these on the body and their immediate removal may be useful. *John W. D. Megaw.*

DENGUE AND SANDFLY FEVER.

NÁJERA, L. Los Phlebotomus de Getafe y la fiebre de pappataci. [**The Sandflies of Getafe and Sandfly Fever.**] *Bol. Soc. Esp. Hist. Nat.* Madrid. 1943, v. 41, No. 5/6, 281–8, 3 figs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Apr., v. 32, Pt. 4, 66–7.]

Following an outbreak of a disease thought by the army doctors to be sandfly fever among troops in a military camp at Getafe in the summer of 1942, the author visited the site and collected 22 sandflies in various huts in about half an hour. He later received 17 more from the same source. The species represented were, in order of decreasing frequency, *Phlebotomus perniciosus*, Newst., *P. minutus*, Rond. (*parroti* var. *italicus*, Adl. & Thdr.) and *P. papatasii*, Scop. He describes and figures the genital armature of the males and the wing and pharyngeal armature of the females of *P. papatasii*; the females taken all contained blood. Records of the alleged occurrence of sandfly fever in Spain are briefly discussed, and it is concluded that though the vector, *P. papatasii*, is present, the evidence for the occurrence of the disease is inconclusive, since transmission experiments have not been carried out.

PLAGUE.

DEVIGNAT, R. **Aeration of Fluid Culture Media. Supplementary Observations.** *Edinburgh Med. J.* 1944, Mar., v. 51, No. 3, 124–30. [19 refs.]

Aeration had earlier been found to result in loss of virulence [this *Bulletin* 1943, v. 40, 390, 391] of the organisms subjected to this treatment. Some unexpected results obtained by the author when repeating his experiments have led him to abandon the hypothesis

that aeration *per se* was the real agency in this effect. In his new experiments he used quick lime (" la chaux vive du marbre ") instead of caustic potash for the removal of water and carbon dioxide from the air before bubbling it through the culture and to his surprise found that the virulence of *P. pestis* was not diminished. This finding leads him to the interesting thesis that the caustic potash used originally to remove carbon dioxide from the air conferred on it the radio activity of beta emanation and it was this that produced an avirulent organism. Lime did not confer any such property upon the air and so the organisms remained fully virulent. Some further experiments were done with hydrogen washed in caustic potash and the tetanus bacillus instead of the plague bacillus as the test organism. They enabled the author to obtain a non-toxic strain of *Cl. tetani*. He would have wished to amplify these experiments and present more controls, but has had to give them in their present tentative form on account of the limited means at his disposal at Blukwa in the Belgian Congo.

W. F. Harvey.

BURROUGHS, A. L. **The Flea** *Malaraeus telchinum* **a Vector of** *P. pestis*. *Proc. Soc. Exper. Biol. & Med.* 1944, Jan., v. 55, No. 1, 10–11.

During a survey in the San Francisco Bay region, *Pasteurella pestis* was found in pooled collections of fleas. In order to find the infected mammalian hosts, 1,356 rodents were trapped and their ectoparasites identified. The rodents comprised the following: meadow mice (*Microtus californicus*) 952; deer mice (*Peromyscus maniculatus*) 347; brown rats (*Rattus norvegicus*) 40; and harvest mice (*Reithrodontomys megalotis*) 17. The details are shown in Table I:—

TABLE I.

Host.	*Species of flea.*
M. californicus	*Cattalagia vonbloekeri*
	Atyphloceras multidentatus
	Hystrichopsylla gigas dippiei
	Malaraeus telchinum
	Peromyscopsylla ebrighti
P. maniculatus	*Atyphloceras multidentatus*
	Hystrichopsylla gigas dippiei
	Opisodasys nesiotus
	Malaraeus telchinum
	Cattalagia vonbloekeri
R. norvegicus	*Malaraeus telchinum*
	Nosopsyllus fasciatus
	Orchopeas sexdentatus
R. megalotis	*Cattalagia wymani*

Since the flea, *Malaraeus telchinum*, was the only one found on all three species of rodent known to be naturally infected with *P. pestis*, it was used for transmission experiments although previous attempts at transmission, made by ESKEY and HAAS [this *Bulletin*, 1941, v. 38, 324] with guineapigs, and by WHEELER and DOUGLAS [this *Bulletin*, 1942, v. 39, 616] with white mice, had failed. The author used infected meadow mice, deer mice and white mice to infect the fleas, and " clean " meadow mice for the infected fleas to feed upon. In 10 experiments four positive transmissions were obtained. *J. F. Corson.*

BACILLARY DYSENTERY.

HUGHES, W. **Treatment of some Complications of Bacillary Dysentery.** [Memoranda.] *Brit. Med. J.* 1944, May 20, 691.

Sulphapyridine has certain advantages over sulphaguanidine in the treatment of dysentery; the latter is costly, a large dosage is required, and there is no soluble salt for parenteral injection in urgent cases. PAULLEY [this *Bulletin*, 1943, v. 40, 241] found sulphapyridine somewhat more effective than sulphaguanidine.

Hughes has used sulphapyridine in 200 cases of bacillary dysentery in Lagos, Nigeria, injecting it intravenously in adults and intramuscularly in children. The infections, which were nearly all caused by Flexner organisms, were often complicated by nutritional deficiencies; ariboflavinosis was very common in adults and infantile pellagra had a high mortality. Undiluted milk was given in sufficient quantity and, in urgent cases, a crude liver extract was injected. In simple cases the results were good. Notes of two African patients, one a man of 25 years, the other an infant of 5 months, are given; in the former case sodium sulphapyridine, 1 gm., was given intravenously and 1 gm. every hour by mouth, while in the case of the infant 0·3 gm. of sodium sulphapyridine was given intramuscularly and sulphathiazole, 0·5 gm. every hour, was given by mouth. Rapid recovery followed in both cases.

J. F. Corson.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

FAUST, E. C. **Some Modern Conceptions of Amebiasis.** *Science.* 1944, Jan. 21 & 28, 45–51; 69–72. [73 refs.]

This article on the subject of amoebiasis is an address delivered by the author before the College of Physicians of Philadelphia on the occasion of the presentation to him of the Alvarenga Prize. It is a comprehensive review of recent observations and experiments on the behaviour of *Entamoeba histolytica* in its relation to human beings and other hosts which may be infected with it. In fact the article, which deals with all aspects of the subject, will repay careful study by anyone who is interested in the epidemiology, pathology, symptomatology and treatment of one of the most widespread of human infections.

C. M. Wenyon.

SHIH LU CHANG. **Studies on *Endamoeba histolytica*. III. Destruction of Cysts of *Endamoeba histolytica* by a Hypochlorite Solution, Chloramines in Tap Water and Gaseous Chlorine in Tap Water of Varying Degrees of Pollution.** *War Medicine.* Chicago. 1944, Jan., v. 5, No. 1, 46–55, 7 charts. [17 refs.]

The experiments described in this paper were designed to throw light on the conditions under which hypochlorite solution and chloramines in tap water kill cysts of *Entamoeba histolytica*, and those under which chlorine kills them in tap water polluted with sewage and proteose peptone. In the experiments a standard suspension of washed cysts in distilled water was used, and this was added in measured amounts

to the tap water. After exposure to the reagents the iodine was neutralized with sodium thiosulphate and the cysts removed by centrifugation. They were then planted in tubes of liver infusion agar medium which had previously been inoculated with the bacteria from successful cultures of *E. histolytica*. It had already been shown that in this medium five cysts were sufficient to give rise to cultures. As in the experiments the inoculum to each tube contained between 4,000 and 5,000 cysts: a negative culture result was an indication that 99·1 per cent. of the cysts had been killed.

In a previous paper the author working with FAIR [this *Bulletin*, 1942, v. 39, 313] has shown that the amount of chlorine required to kill cysts in water is reduced by half if the temperature is raised 20°F., or the *p*H value is lowered from 7 to 6; is reduced 25 per cent. if the contact period is doubled; and is increased by 25 per cent. if the *p*H value is raised to 9. It was also noted that in all these tests *Bact. coli* was destroyed before the cysts.

In the present paper it is shown that the cysticidal activity of the hypochlorite solution, as well as that of the gaseous chlorine, was greatly influenced by the hydrogen ion concentrations of the water. It is thought that the destruction of cysts depends on the amount of active or free chlorine, and this is dependent again on the *p*H of the water. The higher the *p*H the lower is the amount of free chlorine. As regards chloramines, it was found that efficiency was more than doubled and the required contact period reduced to one-fourth when the *p*H was lowered from about 8·6 to 7. In the study of the effect of organic substances on the cysticidal efficiency of chlorine it was found impossible to make any generalizations, for this varied with the physical and chemical nature of the organic substances, and the amount of free ammonia present. It seemed, however, that soluble organic substances, such as proteose peptone, readily combine with active chlorine and thus decrease the efficiency of chlorine more than do those in the form of suspended solids. The effect of sewage on gaseous chlorine was complicated by the high ammonia content, resulting in the formation of chloramines. In an attempt to obtain more accurate and uniform data the oxidation-reduction potentials of the solutions were measured. It appeared that this gave a more accurate estimate of the cysticidal efficiency of chlorine compounds than did the concentration of residual chlorine. It seemed to indicate the amount of active chlorine irrespective of the *p*H and the amount of organic matter present in the water. The conclusion is that in order to be effective the chlorination of water for the destruction of cysts of *E. histolytica* must take into account all the factors that affect the dosage of the particular compound employed. The author does not give any precise indication of the substances or the doses which he employed for the destruction of cysts, but he expresses a hope that the results of the study will permit of an orderly approach to the choice of an effective dosage.

C. M. Wenyon.

PFANNER, W. Weiterer Beitrag zum Amöbenabszess der Leber. [**Further Contribution on Amoebic Abscess of the Liver.**] *Münch. med. Woch.* 1943, Nov. 19, v. 90, No. 46/47, 652–3.

The author has met with 18 cases of amoebic abscess of the liver in Europe, and has operated on 12 of them; in 8 of these the abscess was confined to the liver, being situated in the upper part in 6 and

near the edge in 2. In 3 cases the abscess had ruptured into the subphrenic area and in 1 into the pleural cavity; as much as 5 litres of pus had collected in the subphrenic area in one case. In one the abscess ruptured into the peritoneal cavity and simulated a perforated peptic ulcer.

It is important to observe the blood after operation; if the leucocytosis persists it suggests either retention of pus or the presence of another abscess.

Recovery is astonishingly rapid after treatment of the abscess and of the intestinal infection; the body weight may increase by as much as 3 kgm. within a week.

All the patients had amoebae in the stools but in only two were they found before the abscess was diagnosed. Seven of the patients had been doing military duties up to a short time before operation for the abscess and one even after the abscess had perforated into the subphrenic area. In the three fatal cases neither abscess nor amoebic infection had been diagnosed during life.

Small abscesses do not need to be opened; they will heal with treatment with emetine and yatren. *J. F. Corson.*

DAVID, N. A., PHATAK, N. M. & ZENER, F. B. **Iodochlorhydroxyquinoline and Diiodohydroxyquinoline: Animal Toxicity and Absorption in Man.** *Amer. J. Trop. Med.* 1944, Jan., v. 24, No. 1, 29–33. [11 refs.]

Examination was made of the toxicity of iodochlorhydroxyquinoline (Vioform, N.N.R.) and of diiodohydroxyquinoline (Diodoquin). When single doses are given by mouth, the L.D.50 (dose which kills 50 per cent. of the animals) of Vioform is about 175 mgm. per kgm. in guineapigs and about 400 mgm. per kgm. in kittens. With Diodoquin the percentage of deaths was not proportional to the dose, so that no L.D.50 could be determined; but 20–40 per cent. of both guineapigs and kittens died after doses ranging from 50 to 2,000 mgm. per kgm. [Presumably absorption of Diodoquin, which is very insoluble, is slight; and the development of toxic symptoms will depend much more on variations in the amount absorbed than on the amount given by mouth.] In animals which died after either compound, liver damage was found; the lesions resembled those of chloroform poisoning.

When the compounds were given by mouth to human volunteers (about 9 for each compound) in doses of 0·21–0·25 gm. thrice daily for 10 days, the iodine concentration in the blood (normally about 5–20 microgrammes per 100 cc.) rose by 223 microgrammes (average) after Vioform was given, and by 172 microgrammes (average) when Diodoquin was given; this is evidence that absorption of the compounds has occurred to some extent. The absorption of Diodoquin was more irregular than that of Vioform. Some gastrointestinal discomfort was felt during the administration of these doses and some of the persons experienced pruritus ani.

It is concluded that Diodoquin is potentially more toxic than Vioform on account of its greater iodine content (and also because of the irregularity in its absorption). However, the occasional toxicity which may occur in clinical practice should not preclude their use in the prophylaxis of amoebiasis if such therapy is rigidly controlled.

F. Hawking.

CHALAYA, L. E. [**Intestinal Protozoa among the Population of Frunze (Kirghisia) and their Rôle in the Etiology of Summer Diarrhoeas. First Communication.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1942, v. 11, No. 5, 83–5. [In Russian.]

The author notes that in the medical reports for Kirghisia (Central Asia) amoebiasis is not mentioned, in spite of the prevalence of various intestinal diseases. When occurring in children under the age of two, these are recorded as infantile diarrhoea, or gastro-enterocolitis, while the disorders in adults are attributed to bacillary dysentery and infectious haemorrhagic colitis. With the view to determining the rôle of intestinal protozoa in the aetiology of some of these conditions the author made a survey of the population of Frunze. The total number of persons examined was 800, belonging to various age groups. The incidence of intestinal protozoa amounted to 63 per cent., distributed as follows: *Entamoeba histolytica* (cysts) in 20·6 per cent. [13 per cent. with the large race, 7·6 per cent. with the small race (="*E. hartmanni*")]; *E. coli* 38 per cent.; *Iodamoeba* 32 per cent.; *Endolimax* 15 per cent.; *Giardia* 12 per cent.; *Chilomastix* 10 per cent.; *Dientamoeba* and *Trichomonas hominis* in single cases.

The number of carriers of *E. histolytica* was highest among children from 10 to 14 years old (35 per cent.) and lowest among infants under the age of three (3·4 per cent.). Among adults, 20 per cent. of the workers engaged in food-production proved to be infected with this parasite. The incidence of giardiasis was particularly high in infants under the age of three (22 per cent.). In view of the unsatisfactory sanitary conditions and unfavourable epidemiological factors existing in Middle Asia, the author urges the necessity of further investigations on the pathogenicity of intestinal protozoa, especially of *Giardia*, which is suspected of being responsible for infantile diarrhoeas. She also recommends repeated examination of food workers for *E. histolytica*, followed by treatment of carriers among them. *C. A. Hoare.*

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

PAVLOVSKY, E. N. **A New Vector of the Tick Relapsing Fever** *Ornithodorus nereensis* **Pavl. in Turkmenia.** *C. R. Acad. Sci. URSS* (N.S.). 1941, v. 31, No. 4, 408–10, 1 fig. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Apr., v. 32, Pt. 4, 70.]

A description is given of the adults of both sexes of *Ornithodoros nereensis*, sp. n., which was found, together with two other species of *Ornithodoros*, in the Karakala region of south-western Turkmenistan in 1931. It occurred among stones, in crevices in the walls of huts, and in shallow burrows inhabited by mammals, reptiles or birds. Relapsing fever appears to be of rare occurrence in this district, and none of the ticks taken in 1931 showed evidence of natural infection with spirochaetes, but examples of *O. nereensis* taken in 1936 transmitted spirochaetes to mice and also to man when used in experiments on the treatment of progressive paralysis by induced relapsing fever.

ROBINSON, G. G. **The Stability of Rotenone in a Phenol-Oil Solution.** *Bull. Entom. Res.* 1944, Apr., v. 35, Pt. 1, 1–2.

In solutions of some organic solvents, rotenone changes by oxidation to various derivatives giving a yellow colour and a loss in insecticidal power. A recent paper by this author [this *Bulletin*, 1943, v. 40, 243] described an insecticidal combination of 60 per cent. Shell Oil P31, 15 per cent. ground nut oil, 25 per cent. xylenol and 1·5 per cent. pure rotenone. This solution was tested after a year's storage in ordinary reagent bottles kept in the dark but with ample access to air. The test animal was the tick, *Ornithodorus moubata*. The experiments showed that the old solution was fully as toxic as one newly prepared.

J. R. Busvine.

UHLENHUTH, P. Die Maus als Leptospirenträger, zugleich ein Beitrag zur Frage der Blutdifferenzierung verschiedener Mäusearten. [**The Mouse as a Carrier of Leptospira, together with a Study of the Problem of the Blood Differentiation of Different Mouse Species.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Dec. 11, v. 104, No. 2/5, 338–55. [22 refs.]

An interesting summary of the position of field mice, including two or three allied species, as carriers of leptospiral infection.

The author finds that in Germany field mice are carriers of mud- or field-fever, and that *Leptospira grippo-typhosa* is the usual infective organism. The disease is primarily a mouse infection and there is no evidence for the existence of an exogenous stage of the infection. When various species of mice have become carriers of leptospiral infections, there seems to be a general tendency, especially in Italy, for each of the various types of leptospira to become attached to some particular species of rodent. The author's investigations support the view that the mouse is not such a universal source of infection as the rat with *L. icterohaemorrhagiae*.

It does not seem possible to establish a stronger parallel between the study of Muridae and mud- or field-fever. Different species of mice vary considerably in their susceptibility to leptospira and the author gives a table showing the species of rodents that have been found infected with these organisms.

Finally details are given of precipitin reactions with field-mouse (*Microtus arvalis*) and ordinary white mouse antisera prepared by injecting rabbits with the blood of these two species.

Microtus arvalis antiserum was found to give precipitin reactions not only against the same species but also against *Microtus agrestis*, *Clethrionomys glareolus*, and less strongly against *Apodemus sylvaticus* and *A. flavicollis*; but was completely negative against the white mouse and house mouse. White mouse antiserum, on the other hand, reacted not only with the blood of the house mouse and white mouse but also with that of *Clethrionomys glareolus*, *Apodemus sylvaticus* and *Apodemus flavicollis*.

[The author gives only the common German names for the various rodents in his table showing the results of the precipitin reactions. The specific identifications above have been made from Brehm's "Tierleben."]

E. Hindle.

SCHÜFFNER, W. & BOHLANDER, H. Ueber den verschiedenen Verlauf des durch Leptospiren hervorgerufenen Nierenprozesses bei Feldmaus und Ratte. [**Various Details of the Kidney Changes in Field Mice and Rats infected with Leptospira.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Dec. 11, v. 104, No. 2/5, 237–43, 3 figs.

It is characteristic of all known pathogenic leptospirae for the organism to appear in the kidney and urine at an early stage of the infection. They may begin to appear by the 7th day or not until the 20th. The organisms settle in the epithelium of the convoluted tubules and build up colonies from which the infection gets into the urine and may persist for long periods.

The authors find that field mice [presumably *Microtus arvalis*] infected with *L. grippo-typhosa* show a similar type of kidney infection to that in rats infected with *Leptospira icterohaemorrhagiae*. In both there is the establishment of a pure culture of the organism, but whilst in the rat the infection generally persists for life, in the field mouse the infection is much more intense and rarely persists for longer than one month. As a result Weil's disease is more endemic than " mud-fever " or " field-fever," which appears in relatively short summer or autumn epidemics. Other factors also contribute to the spread of the infections ; flooding, agricultural labour, or mouse bite in the case of field fever ; and swimming and bathing in Weil's disease.

Finally the authors consider that in epidemiological studies, examination for leptospira is preferable to serological tests, as it gives much more reliable results. *E. Hindle.*

MACHADO GONZÁLEZ, A. Contribución al estudio del sodoku en Venezuela. [**Rat-Bite Fever in Venezuela.**] *Bol. Hospitales.* Caracas. 1943, Sept.-Dec., v. 42, Nos. 5–6, 271–90. [10 refs.]

This is a thesis presented for the Doctorate of Medicine at the Central University of Venezuela. The only part not already to be found in the usual textbooks is that recording the history of the disease in Venezuela and notes of four cases. What is known about rat-bite fever in that country may be said to date from 1924 when Dr. TEJERA [this *Bulletin*, 1925, v. 22, 180] reported that in examining rats prior to experimentally inoculating them with *P. pestis* he found some with enlarged glands in the neck and groin and the spirochaete in the blood and he was able to transmit infection to the guineapig. It was then found that 10 per cent. of rats examined in Caracas were harbouring the spirochaete and there is little doubt that for some time, perhaps years, among cases of continued fever of uncertain origin, some at least were due to this infection. In 1937 Dr. HERNANDEZ ZOZAYA observed a case in an infant, but apparently the first to be published in Venezuela was one by GARCIA DIAZ in 1939. The four cases recorded by the author were in a child of six weeks, a boy of eight years, a girl of six years and a woman of 27 years. The history was clear in each instance.

H. Harold Scott.

HELMINTHIASIS.

COLLIER, H. B. & ALLEN, D. E. **The Haemolytic Action of Phenothiazine Derivatives.** Reprinted from *Canadian J. Res.* 1942, Oct., v. 20, D, 283–90, 1 fig. [29 refs.]

Anthelmintic doses of phenothiazine are relatively non-toxic to sheep, but have caused haemolytic anaemia in horses and in man and at least one human subject has died after their administration [see this *Bulletin*, 1943, v. 40, 932–933]. Collier and Allen have failed to find any direct haemolytic action of the phenothiazine derivative, phenothiazone, on the erythrocytes of horses *in vitro*. They have now, however, shown, by the technique of PONDER (*J. Gen. Physiol.*, 1941, v. 25, 247), that some of the soluble derivatives of phenothiazine accelerate the haemolysis of red cells which is produced by lysins such as saponin and lysolecithin. They suggest that this accelerating effect may explain the haemolytic anaemia which occurs when phenothiazine is given to some species of animals.

For the details of the technique used the paper must be consulted. The time required for a 50 per cent. haemolysis of washed red cells by a known amount of lysin (saponin or lysolecithin) was first determined and then the time required for a 50 per cent. haemolysis by the same amount of lysin in the presence of the phenothiazine derivative to be tested. The derivatives tested were phenothiazone, thiazine, S-methyl sulphonium perchlorate, N-methyl phenothiazine, the conjugate, potassium leucophenothiazone, recovered from the urine of sheep and horses to which phenothiazone had been given, and synthetic conjugate made by the method of BURKHARDT & LAPWORTH, (*J. Chem. Soc.*, 1926, 684). None of the tested derivatives alone caused any haemolysis.

It was found that, *in vitro*, the haemolysis of horse erythrocytes by saponin or lysolecithin was powerfully accelerated in the presence of phenothiazone, thiazine S-methyl sulphonium perchlorate and especially the urinary conjugate, potassium leucophenothiazone sulphate. The authors have observed in the plasma of horses, a concentration of this conjugate which is sufficient to cause, *in vitro*, a very marked acceleration of the haemolysis. The conjugation of leucophenothiazone to the sulphate is a detoxifying mechanism, but may, in the light of these experiments, actually intensify the haemolytic effect. The conjugate, potassium leucophenothiazone sulphate, is also believed to be the derivative of phenothiazine which is present in the blood of treated sheep (COLLIER, *Canadian J. Res.*, 1940, v. 18, D, 272). Phenothiazone and thiazine S-methyl sulphonium perchlorate are also powerful chloesterinase inhibitors (COLLIER and ALLEN, *Canadian J. Res.*, 1942, v. 20, B, 189). In the presence of the accelerators the antihaemolytic effect of the antihaemolytic substance present in normal serum was exerted. Sheep red cells are more resistant to haemolysis and to its acceleration by these derivatives. About three times the concentration of saponin was required to obtain the same rate of haemolysis as in the horse red cells and the acceleration produced by the phenothiazine derivatives was appreciably less. Horse red cells were lysed by 0·026 per cent. of sodium choleate but phenothiazone had little accelerating effect on this.

Phenothiazone did not produce a photodynamic haemolysis such as that demonstrated by BLUM *et al.* (*J. Cell. Comp. Physiol.*, 1937,

v. 9, 217) in the presence of dyes such as rose bengal. Large and repeated doses of phenothiazine given to rabbits and guineapigs, kept on a diet relatively free from vitamin B complex, failed to produce any significant anaemia [*cf.* SCHNITZER, SIEBENMANN and BETT, this *Bulletin*, 1942, v. 39, 862]. *G. Lapage.*

PLAZA IZQUIERDO, L. La esplenectomia en las formas hepato-esplenicas de la Bilharziosis Mansoni. [**Splenectomy in Hepato-splenic Forms of Schistosomiasis mansoni.**] *Rev. Policlinica Caracas.* 1943, Sept.-Oct. v. 12, No. 72, 280–306, 4 figs. [13 refs.]

An M.D. thesis for the Central University of Venezuela. The author divides cases of infection by *Schistosoma mansoni* into two main groups, the hepato-intestinal and the hepato-splenic, and the latter he calls the Banti form (Banti Bilharziano). In Venezuela, the author maintains, Banti's disease is nearly always due to *S. mansoni*, the infestation being mainly, perhaps entirely, due to male worms. The diagnosis is made from the histological changes or from biopsy examination of the liver for, it is stated, " neither the parasite nor its ova are found in the spleen," the eggs being rapidly destroyed by the reticulo-endothelial phagocytes in the spleen. The enlargement may be due to perisplenitis, to infarction or to portal obstruction. There is usually some degree of anaemia with leucopenia, in part due to hypomyelia (inhibition of the haematopoietic function of the bone-marrow). The best time for splenectomy is the early stage, but benefit may result in the late secondary or even tertiary stages. The technique of the operation is described. The results are cessation of haemorrhage, improvement in the blood state and the general condition. Two cases are detailed from the author's records of twenty. Six deaths occurred, ascribed respectively to myocarditis, to haemorrhage from pylephlebitis six days after the operation, to uncontrollable haemorrhage during the operation due to breaking down of multiple adhesions, to blood transfusion which set up convulsions in which death took place, to internal abdominal haemorrhage, and to intestinal obstruction with signs of peritonitis. *H. Harold Scott.*

MORENAS, L. Les réactions d'allergie cutanée dans la distomatose humaine à *Fasciola hepatica*: cuti et intra-dermo-réaction. [**Cutaneous Allergic Reactions in Human Distomiasis due to *Fasciola hepatica*: Scratch and Intradermal Reactions.**] *C. R. Soc. Biol.* 1943, Sept., v. 137, No. 17/18, 563–5.

In each of two families in the Roanne region two members were infested with *Fasciola hepatica* and the others were suspected of having this infestation. There was an eosinophilia of 6–51 per cent. Antigen was prepared from washed, dried and powdered freshly collected *F. hepatica* of the ox. For the scratch reaction this powder was incorporated in glycerin. For the intradermal reaction 1 gm. of the powder in 10 cc. of physiological saline was evaporated by heat to half its volume and 10 cc. of glycerin were added to this. The whole was brought to the boil and diluted again with physiological saline to make a 1 : 100 extract. This is the technique of SIEVERS and OYARZUN [this *Bulletin*, 1932, v. 29, 745] for their work on sheep infested with *Fasciola*. Scratch and intradermal tests were done on seven members of one family and on five of the other, and on 12 controls (three healthy and

nine suffering from various diseases, including one with *T. saginata* and one with *Echinococcus* of the liver and peritoneum. The scratch reaction, done by scarification of the upper third of the arm, was considered positive when the result was urticarial swelling on the scratches within the first hour, and strongly positive when the urticarial tracks became confluent to form a plaque. The intradermal reaction, done by injecting 0·25 cc. of the extract into the skin, was considered positive when, 10 minutes after the injection, there appeared an extension of the papule which acquired an urticarial look and an erythematous halo with infiltration into the subjacent skin.

In the first family the intradermal reaction was positive in all six of the seven members; the eldest son, who did not live with them, was negative; it was more marked in the two members convalescent from fluke infestation. The scratch reaction was positive in four members, two of these being the two infested with fluke; and negative in the other three, among whom was the eldest son.

In the second family the intradermal reaction was positive in all the five members and more marked in the two convalescent from fluke infestation. The scratch reaction was also positive in all five.

Of the 12 controls, all were negative to the scratch reaction. The intradermal reaction was negative in 8 and doubtful in 4. It was thus negative in the two who had *T. saginata* and *Echinococcus*. This suggests that the test is specific to Trematodes and possibly to *F. hepatica*.

The author thought that the doubtful reactions might be due to the glycerin or to excessive concentration of the extract. Two new antigens were therefore made, one at a dilution of 1 : 200 in Coca's solution [a buffered saline solution with 0·5 per cent. phenol] and one at 1 : 1,000 in physiological serum [saline] with the addition of 1 : 3,000 of Sunoxol [Quinosol or Chinosol]. All the controls who gave doubtful reactions with the extract first used were frankly negative to these second extracts, but it was not possible to test the persons infested with flukes. The scratch reaction is, in the author's view, less sensitive but more accurate than the intradermal and he recommends the use of both together. *G. Lapage.*

VON BONSDORFF, B. **On the Remission after Removal of the Worm in Pernicious Tapeworm Anemia in Presence and Absence of Extrinsic Factor in the Food.** *Diphyllobothrium latum* **and Pernicious Anemia VI.** *Acta Med. Scandinavica.* 1943, v. 116, No. 1, 77–95, 12 figs.

In an earlier paper (*Acta Med. Scandinavica*, 1940, v. 105, 516) the author showed that in patients with pernicious anaemia who were infected with *D. latum*, the expulsion of the worm usually resulted in a reticulocyte response and rapid blood regeneration, so that the anaemia in such cases can be regarded as due to the parasite. The implication of this result is that the patients have all the ingredients for the endogenous production of the antianaemic principle and that Castle's intrinsic factor is available. The author gave direct proof of this in another paper (*Acta Med. Scandinavica*, 1940, v. 105, 540). Castle's theory, however, requires the interaction of the intrinsic factor with an extrinsic factor in the food. Presumably the latter was present in the food of the patients previously studied, who were on the usual hospital

diet, which contained milk, meat and other animal products. In this paper the author records the effects of the elimination of these from the patients' diet.

All the patients were young, aged 20–41 years, and most of them were soldiers. The eggs of *D. latum* were found in the faeces of all of them. Immediately on admission they were given a diet presumably free from Castle's extrinsic factor, or at any rate poor in it (carbohydrates, fat and vegetables). After some days the worm was expelled and the same diet was continued for 12–18 days, which is long enough to enable a reticulocyte response and the beginning of blood regeneration to appear, if the absence of the extrinsic factor makes no difference. On a mixed diet the author found (*Acta Med. Scandinavica,* 1940, v. 105, 516) that an increase of reticulocytes begins 4–6 days after expulsion of the worm and its peak is reached in 7–13 days ; regeneration of red blood cells begins immediately after expulsion of the worm.

In the patients here described, from whose diet the extrinsic factor was presumably absent, the author usually found that there was no increase of reticulocytes even 15 days after expulsion of the worm ; and that there was no increase of red blood cells. In some cases the red blood cell curve fell so much that the experiment had to be stopped and the patient had to be given a mixed diet or injections of liver extract. Such cases are omitted from the results here given.

As soon as substances supposed to contain Castle's extrinsic factor were given, a rapid change occurred. There was a strong reticulocytosis and blood values were improved. This happened when any one of the following substances was restored to the diet : meat, milk, casein, commercial peptone, brewer's yeast, concentrated yeast extract and, to a lesser degree, soya bean.

The 12 cases are briefly described and the paper is illustrated by graphs. A table gives the details of the blood picture. [See also this *Bulletin,* 1940, v. 37, 215 & 216.] *G. Lapage.*

DE MEILLON, B. & LAVOIPIERRE, M. **South African "Creeping Eruption."** *South African Med. J.* 1944, Apr. 8, v. 18, No. 7, 115–16, 1 fig.

Faeces of South African dogs which contained many hookworm ova were mixed with charcoal and water and kept in a covered dish ; on the 13th day filariform larvae appeared and about 50 were placed on the left arm of a volunteer and kept there for about 20 minutes. No pricking sensation was felt. On the following day, December 25th, 1943, a small red spot appeared on the skin, and the place itched ; the spot had grown to a dull red papule, about 10 mm. wide, by December 26th, and on December 28th there was an erythematous serpiginous eruption, over one inch long, with tiny vesicles. Itching was intense at night or when in a hot bath. During the next few days there was little change, but on January 4th a "new tunnel" appeared. The lesion was typical of "creeping eruption," or "sand-worm" eruption, as seen in South Africa. No attempt was made to identify the worm but the common hookworms of South African dogs are *Ancylostoma braziliense* and *A. caninum.*

MURRAY [this *Bulletin,* 1940, v. 37, 229] attributed his cases of "sand-worm eruption" to mites which he found in the lesions. The

present authors examined these mites and concluded that they were not the cause of the eruption, but were merely present accidentally.

J. F. Corson.

i. SMITH, D. C. **The Treatment of Creeping Eruption with Sodium Antimony Biscatechol (Fuadin).** *J. Amer. Med. Ass.* 1943, Nov. 13, v. 123, No. 11, 694–5.

ii. RUBIN, S. S. **Creeping Eruption.** [Correspondence.] *Ibid.* 1944, Mar. 4, v. 124, No. 10, 668.

iii. BLANK, H. **Use of Fuadin in Creeping Eruption.** [Correspondence.] *Ibid.* 1943, Dec. 11, v. 123, No. 15, 989–90.

i. Creeping eruption has been attributed to the larvae of flies and intestinal parasites ; in the United States the common cause is the larva of the dog or cat hookworm. Freezing or cauterization of the skin at the site of the parasite is usually successful in curing the condition ; the author reports a case in a small child who had multiple infection, where freezing was impracticable. He decided to try Fouadin and recommended intramuscular injection of 2 cc. of a 6·3 per cent. solution daily for five days, followed by an interval of one week and a repetition of the course. By the third injection of the second course all signs of the infection had gone and the injections were discontinued.

ii. Rubin reports another case successfully treated with Fouadin, in a man in whom 32 distinct active tracks were seen.

iii. On the other hand Blank reports failure of the treatment in a patient with about 50 severely pruritic linear lesions. In this case biopsy revealed one of the parasites, probably the larva of *Ancylostoma braziliense.* The best results were obtained by freezing with ethyl chloride.

Charles Wilcocks.

SOMMER, E. Askaridiasis und eosinophiles Lungeninfiltrat. [**Ascariasis and Lung Infiltration with Eosinophilia.**] *Schweiz. med. Woch.* 1943, Sept. 18, v. 73, No. 38, 1132–7, 5 figs. [29 refs.]

During the last 20 years the group-name " atypical pneumonia " has been used to include all kinds of transient infiltrations of the lung which are not tuberculous and are not classical pneumonia. Among these are Löffler's syndrome, " pseudosyphilitic pneumonias," infiltrations ascribed to Bang's bacillus and to viruses and others which are regarded as being allergic, asthmatic, or due to Ascaris infestations. Löffler's syndrome (LÖFFLER, *Schweiz. med. Woch.*, 1936, v. 66, 1069 ; see also *Lancet*, 1941, March 22, 387) has a typical brief course, lasting 1–3 weeks, with a slight initial rise of temperature and scanty yellow sputum. The infiltration can be studied by X-ray examination and, when this shows that it has reached its maximum density, the blood shows a marked leucocytosis, with a relative lymphopenia and a gradual rise in the number of the eosinophils, which reaches its maximum on the third to the eighth day of the illness. This lag of the eosinophilia behind the clinical signs is characteristic. There is no " shift to the left " and this fact is useful in the differential diagnosis from pneumonia. The blood sedimentation rate does not show uniform changes, but there is usually a marked rise in it. After 1–3 weeks all the signs disappear and the X-ray shadows have usually gone before the blood returns to normal.

The author agrees with the view that this eosinophil infiltration is an allergic reaction of the lung. It can be produced by various allergens

(*e.g.*, pollens). The same allergens which cause urticaria in sensitized persons in whom the skin is the reacting organ may also cause eosinophil infiltration of the lung in sensitized persons in whom the lung is the reacting organ. There is, the author thinks, no clear evidence that there is a tuberculous cause of eosinophil infiltration of the lung.

Contrasting the experiments of KOINO [this *Bulletin*, 1923, v. 20, 235] and MÜLLER (*Beitr. Klin. Tbk.*, 1938–9, v. 92, 254), who both infested themselves by the mouth with *Ascaris* eggs, Sommer concludes that Koino suffered from a " pneumonia " caused mechanically by the migration of large numbers of *Ascaris* larvae from the 2,000 eggs which he swallowed ; he was probably not sensitized to *Ascaris*, did not observe yellow sputum and had a condition markedly different from eosinophil infiltration of the lung. Müller, on the other hand, swallowed only a few *Ascaris* eggs ; he had previously had an eosinophil infiltration of the lung [the possible cause of this is not stated or discussed] and was probably sensitized to *Ascaris* ; he had the typical clinical picture of eosinophil infiltration of the lung (maximum blood eosinophilia 19 per cent. on the seventh day) ; no larvae were, however, found in his sputum and Müller concluded that a few larvae could cause eosinophil infiltration and that they would not be found by ordinary sputum examinations. Sommer thinks that Müller's eosinophil infiltration was an example of the anaphylactic release of this syndrome in a sensitized subject by infestation with only a few larvae. These two types of lung condition due to *Ascaris* infestation must be differentiated and there may be mixtures of the two types. There is, he thinks, some support for this theoretical view in the view of FLURY (*Arch. Exper. Path. u. Pharm.*, 1912, v. 67, 275) that the toxicity of *Ascaris* is especially due to aldehydes of the fatty acids and he cites the fact that BORCHARDT [this *Bulletin*, 1929, v. 26, 986] produced experimentally an eosinophilia with aldehydes. When *Ascaris* sensitivity exists—and it can exist for years—there may be several exciting causes of eosinophil infiltration of the lung. If the person is sufficiently sensitive the swallowing of a single *Ascaris* egg may be enough to release an anaphylactic eosinophil infiltration. This infiltration is similar to the urticaria of persons sensitized to various allergens, including *Ascaris* material. [It is not clear whether the author thinks that in persons sensitized to *Ascaris*, other allergens, such as pollens, may release an eosinophil infiltration of the lung or *vice-versa*.] Sommer proposes to call the condition eosinophil anaphylactic pneumonia.

In support of his view he describes in detail the symptoms of a woman aged 35 who had tuberculosis of the *left* lung ; tubercle bacilli were found. In June the blood count was normal, except for a lymphocytosis of 39 per cent. The blood sedimentation rate was 4–5 mm. Westergren average. In August the sputum was colourless. In September conjunctivitis and in November swelling of the eyelids appeared, followed by a slight rise of temperature and severe headache with a markedly labile psychic state. X-ray examination revealed a wedge-shaped infiltration in the *right* upper lobe of the lung which resembled pneumonia. The amount of the sputum was much increased and in it there were yellow portions, seen only in the fresh sputum, which contained masses of eosinophils and many Charcot-Leyden crystals. These yellow portions were strongly benzidin-positive, while the rest of the sputum was not. The Berlin blue test was negative. The blood picture was now typical of eosinophil infiltration of the Löffler type, *i.e.*, there was a marked leucocytosis with a relative

lymphopenia and a slowly increasing eosinophilia which reached its maximum of 13 per cent. on the fourth day of the illness and then fell at a uniform rate. Leucocytosis reappeared in the second week. By the 16th day all the symptoms had disappeared, except the headache. On December 6th, however, there was again a slight rise of temperature (39·5°) which quickly fell again. The sputum was again increased in quantity and somewhat yellow and contained eosinophils and Charcot-Leyden crystals (less abundant). Marked headache and an eosinophilia of 20 per cent. were accompanied by signs suggesting tuberculous meningitis ; but these meningeal symptoms, especially the almost epileptiform convulsions, suggested an *Ascaris* infestation. No *Ascaris* eggs were, however, found after repeated examinations. The patient refused a lumbar puncture [*cf.* CAETANO DA SILVA, Jr. & FLOSI (this *Bulletin*, 1944, v. 41, 501) who record a case with symptoms suggesting acute tuberculous meningitis, in which the cerebrospinal fluid showed no indication of meningitis and the symptoms disappeared when the patient spontaneously voided about 9 *Ascaris*].

VON MEYENBURG (*Schweiz. med. Woch.*, 1942, v. 72, 809) has shown that eosinophil infiltration of the liver and epididymis may also occur and it is possible that it may occur in the meninges. This second attack may have been of this nature with a light diffuse reaction in the lung. The temperature and blood picture were as before although the blood sedimentation rate reached 21 mm. Again there was the recurrence of the leucocytosis in the second week. Bellergal and calcium injections improved the meningeal symptoms. SOGEMEYER (*Münch. med. Woch.* 1938, v. 85, 669) has observed the almost specific action of calcium on symptoms due to "worm allergy."

During the succeeding weeks two milder eosinophilias appeared (13 and 9 per cent.), both associated with slight rises of temperature and symptoms ascribed to worm infestation, but the lungs remained unaffected. A vermifuge given later expelled a single adult male *Ascaris*. From that date all the symptoms, which were still present but mild, disappeared suddenly and the blood rapidly became normal. Sommer suggests that a single *Ascaris* had caused an anaphylactic pneumonia in a patient previously sensitized.

To find out whether the patient was in fact sensitized, Sommer prepared an ointment containing antigen from a human *Ascaris* and rubbed this into the skin below the collar bone of the patient from whom the *Ascaris* was obtained and also into the skin of others, including some known worm carriers without symptoms of infestation and persons who had had *Ascaris* infestations. The reaction of all these was negative. It was also negative in a person who had not had *Ascaris* but had had for three years in succession a "seasonal" eosinophil infiltration of the lung (in May), which was assumed to have not been an *Ascaris* pneumonia. When, however, this ointment was rubbed into the skin of the patient under consideration it caused, in 10 minutes, a marked, strongly itching immediate urticaria, a photograph of which is reproduced. Within an hour this had disappeared.

A 6·5 per cent. solution of the antigen in carbol-saline was then injected into the skin. A local immediate reaction followed and also typical anaphylactic shock with generalized and strongly itching urticaria which persisted for a long time. The severe symptoms are described in detail. The temperature was subfebrile throughout, but the blood picture was again like that found during the previous eosinophil infiltrations, the eosinophilia reaching a maximum of 8 per cent. ; the

blood sedimentation rate was not affected. Five hours after the injection there was hardly an eosinophil to be found among 500 cells; they had almost completely left the circulating blood. The author refers to work of others who noted outwandering of eosinophils from the blood to the bronchial tissues in asthma and to the finding at autopsy by DEAN and WEBB (*J. Path. & Bact.*, 1924, v. 27, 51) of eosinophils in the periportal tissues of the liver in a case of anaphylactic shock. In his case, Sommer regards the shock as atypical; dyspnoea and circulatory weakness were less evident than the colic, vomiting, diarrhoea and general prostration. Remarking that it is known to be difficult to produce anaphylactic shock in tuberculous animals, he suggests that in his patient the tuberculosis may have damped down the shock.

Attempts were also made to produce eosinophil infiltration of the lung in this patient by direct inhalation of the allergen into the lung, and apparently they succeeded.

The effects of the skin test show how dangerous such tests may be in sensitized patients, and medical men are warned of this. The percutaneous ointment test is, however, suitable for general use for the diagnosis of *Ascaris* sensitivity (not for *Ascaris* infestation) and is simple, harmless and convincing. [*Cf.* ALWALL (this *Bulletin*, 1944, v. 41, 425) on the pathology, aetiology and treatment of Löffler's syndrome; CLAVEAUX *et al.* (this *Bulletin*, 1944, v. 41, 501) on Löffler's syndrome and trichiniasis; VENZANT QUINTANA (this *Bulletin*, 1940, v. 40, 400) on Löffler's syndrome and *Necator americanus*; and this *Bulletin*, 1941, v. 38, 538.] *G. Lapage.*

SCOTT, J. G. **Ocular Syndrome in Onchocerciasis.** *Brit. Med. J.* 1944, Apr. 22, 553–4.

The author describes two cases of infestation with *Onchocerca volvulus*, one of which is believed to be the first case of onchocerciasis in a Gambian. The symptoms observed were proptosis, oedema of the upper eyelid, ciliary flush and oedema of the optic nerve. The author suggests that the syndrome was due to an anaphylactic oedema caused by *O. volvulus*.

The first subject, a Gambian soldier, was admitted to hospital with painful watering of the right eye, which began the day before admission. Vision was 6/5 R and 6/5 L. There was slight ciliary flush in the right eye, but the media were clear and the fundi normal; the next day the right upper lid was swollen and there was slight proptosis. General examination revealed no abnormality. Day and night blood films showed no microfilariae, but a triple-centrifuged specimen of blood revealed a few *Acanthocheilonema perstans*, which is very common in West Africa; no microfilariae were found in a snip of conjunctiva. The Kahn test was positive, a common finding in a yaws-infected population. After five days the proptosis became less, but the right fundus showed blurring of the disk and next day vision was 6/36R and 6/6L. The lower half of the right disk was covered with exudate. Oedema of the right upper lid and the proptosis gradually faded during the next 15 days, but the right fundus slowly developed a low-grade oedema, with swelling of the nerve-head of 1 or 2 dioptres. The upper temporal

veins became veiled with exudate with a few flameshaped haemorrhages round the disk at 10 and 7 o'clock. The macula remained normal till the 13th day, when it developed a complete star reflex. By the 33rd day, the right fundus was returning to normal. The patient had been treated with atropine and heat to the right eye. On the 60th day the vision was 6/5R and 6/5L, the haemorrhages had been absorbed and only slight fulness of the upper lid remained. On the 75th day a slit-lamp became available and with it "one microfilaria was seen in the right and left anterior chambers." There were no microfilariae in day and night blood films. From this time until the 90th day microfilariae were seen on most days in both eyes and on this day the patient was discharged with the right fundus normal. A course of N.A.B. given to him was by then finished. Later it was possible to withdraw a microfilaria from the anterior chamber and this was found on staining to be *O. volvulus*. These microfilariae were also found in a skin snip, although no nodules could be felt. The right eye showed one fresh yellow speckled opacity in the cornea, which the author has seen only in cases of onchocerciasis. Five and seven months later the patient was well and had no trouble with vision or pain in the eyes, although microfilariae were present in each anterior chamber. Except for the faintest veiling of the margins of the right disk, the fundi were normal.

The second case was admitted with a painful swelling of the right axilla, which was incised and cleared. A mild oedema of the right upper eyelid and ciliary flush developed into oedema which closed the right eye and proptosis appeared. Both fundi remained normal. Vision fell during 10 days from 6/9 on admission to 1/60. General examination gave normal results. Day and night films showed scanty *A. perstans*. Many microfilariae of *O. volvulus* were found in a skin snip and there were typical nodules over the right and left iliac crests. No microfilariae were seen in either anterior chamber. By the 27th day, vision was 6/5R and 6/5L. The right fundus was normal throughout, so that the neuritis in this case was retrobulbar. The author says that no single finding was sufficient to establish the diagnosis, but the oedema of the upper eyelid, the proptosis, ciliary flush and optic neuritis indicated a lesion behind the eyeball, the probable causes of which are haemorrhage, tumour, infection and congestion. The absence of subconjunctival ecchymosis excluded haemorrhage; tumour was improbable because of the lack of other signs, and the complete recovery; infection (orbital cellulitis or cavernous sinus thrombosis) was unlikely. Against orbital cellulitis were the lack of any history of earlier sinus trouble, the normal white cell count and the healthy appearance of the orbit on X-ray examination. Against cavernous sinus thrombosis was the absence of any primary lesion on the face or in the mouth. The unilateral optic neuritis might suggest syphilis, but this was improbable because of the absence of choroidal changes and unequal pupils and the negative Kahn test in the second subject. Disseminated sclerosis is a cause of retrobulbar unilateral neuritis but it does not cause proptosis and is very uncommon on the West Coast. The subsequent history ruled out neuromyelitis optica and Schilder's disease. Venous congestion was ruled out by the absence of early fulness of the retinal veins. The association of lymphatic swelling and filariasis is well recognized, but the author considered direct block of the retrobulbar lymphatics by microfilariae unlikely. He favours the theory that anaphylactic oedema, due to the toxins of *O. volvulus*, was the explanation of the symptoms observed. *G. Lapage.*

CARRICK, L. **The Parathyroid Glands in Trichinosis.** *Amer. J. Clin. Path.* 1944, Jan., v. 14, No. 1, 24–7. [12 refs.]

McGOWAN (*Biochem. J.*, 1932, v. 26, 1138) has shown that injection of large doses of parathormone into laying hens produces a deposition of tri-calcium phosphate in the walls of the blood vessels, and thinks that the parathormone liberates calcium hydrogen phosphate from the bones by direct stimulation of the osteoclasts. VON BRAND, *et al.* (*Amer. J. Hyg.*, 1938, v. 27, 461) claimed to have caused calcification of cysts of *Trichinella spiralis* in rats by injecting massive doses of parathormone which eventually caused death. The heaviest deposits were round the poles of the capsules. DE ROBERTIS (*Anat. Rec.*, 1941, v. 79, 417) induced parathyroid hyperplasia experimentally by low calcium diets and there is circumstantial evidence that low serum calcium is a stimulus to the production of more parathormone.

The author used nine control guineapigs and nine others. To each of the latter he gave 500 *Trichinella* larvae through a catheter introduced into the stomach. The larvae were prepared by the method of QUEEN (*Amer. J. Clin. Path.*, 1939, v. 9, 209) and only viable larvae were used. At about 19-day intervals the guineapigs were bled from the heart and the serum calcium was determined by the method of CLARK and COLLIP (*J. Biol. Chem.*, 1925, v. 63, 461). Serum phosphatase and inorganic phosphorus were determined by the method of BODANSKY (*Amer. J. Clin. Path.*, Tech. Suppl., 1937, v. 7, 51). After an average time of 93 days the guineapigs were killed and sections were made of the parathyroids. The variations in the size of the parathyroids and the results of the chemical examination of the blood are shown in tables. As each animal was killed its skeletal muscles were digested by the method of QUEEN (*op. cit.*) and the number of *Trichinella* larvae was counted under a dissecting microscope.

In six of the nine infested animals there was slight loss of weight beginning about the 12th day. ROTH (*Amer. J. Hyg.*, 1939, v. 29, D, 89) found a similar loss of weight, but most often beginning between the fourth and sixth week. In the nine controls the mean value of the serum calcium was 12·9 mgm. per cent.; the inorganic phosphorus was 4·97 mgm. per cent.; and the phosphatase activity 3·01 units. In the nine test animals there was no significant variation from the norm and the values were, on the average, the same as the controls. BEAHM and JORGENSEN [this *Bulletin*, 1942, v. 39, 478] found significant increases of serum calcium in only 4 out of 13 dogs infested with *Trichinella*. In 44 human cases of trichiniasis PIERCE *et al.* (*Amer. J. Hyg.*, 1939, v. 29, D, 75) found only a slight elevation of inorganic phosphorus during the second and third months after infestation and the blood calcium was near low normal levels early in the infestation but gradually increased during convalescence. Microscopically the parathyroids in the test animals showed hypertrophy and "hyperplasia of the chief cells." Invasion of the skeletal muscle by young larvae and their encystment there occurred between the 33rd and the 44th days after infestation. Calcified larvae without cysts were found in the myocardium. DUNLAP and WELLER (*Proc. Soc. Exper. Biol. & Med.*, 1933, v. 30, 1261) found larvae in the myocardium of white mice as early as five days after feeding them with infested meat, but do not mention calcified larvae. *G. Lapage.*

SCHREIBER, W. Tierversuche zur Chemotherapie der Trichinose. [**Animal Experiments on the Chemotherapy of Trichiniasis.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Dec. 11, v. 104, No. 2/5, 126–34.

Referring to the outbreaks of trichiniasis in German troops in Poland and Norway and to cases among their relations to whom the soldiers sent uninspected pork [see *Bulletin of War Medicine*, 1942, v. 3, 236, and 1943, v. 3, 337] the author records that some German doctors who treated these patients found that fouadin reduced the temperature and improved the general condition, while others, especially those who treated patients on leave in Germany, were sceptical about its good effects. Some of the literature on this treatment is cited. The author infested guineapigs and white rats with *Trichinella* and gave them injections of tartar emetic, stibosan, stibenyl, antimosan and fouadin. In every instance the guineapigs and rats developed infestations of the muscles with larvae which were equal to those of the controls not given these drugs. These antimonial compounds had, therefore, no effect on the parasites. Treatment of trichinosed guineapigs and rats with Bismistho-Yatren, phenocoll, colloidal iron and copper and with dyes, the names of which are not given, also failed to prevent larval infestation of the muscles. *G. Lapage.*

POLLEY, T. Z. & MURPHY, F. D. **Cardiac Involvement in Trichinosis : Report of a Case in which there were Electrocardiographic Changes.** *Amer. Heart J.* 1944, Feb., v. 27, No. 2, 266–72, 6 figs. [19 refs.]

DEFICIENCY DISEASES.

NICHOLLS, L. **Nomenclature of Malnutrition.** *Lancet.* 1944, May 13, 630.

It is difficult to give comprehensive names to states of ill-health due to malnutrition ; poor diets are always deficient in more than one respect and individual reactions to deficiencies vary. In a large prison in Ceylon all the prisoners received the same diet and the same amount of it ; 55 per cent. had phrynoderma, 30 per cent. night blindness, 18 per cent. sore mouth, 16 per cent. scrotal dermatitis. Many complained of neuritic symptoms and some showed signs of neuritis ; tentative diagnoses of neuritis, poliomyelitis, ataxia and beriberi were made. It was reasonable to conclude that all the prisoners " were in a state of multiple vitamin deficiency."

In a children's hospital in Colombo 30 consecutive cases of malnutrition were studied ; various conditions of the skin, mouth and eyes and general symptoms pointed to vitamin deficiency. It is thought that the shortage of rice and its replacement by white flour of 72 per cent. extraction might have been connected with the malnutrition of the children.

The author suggests the use of the letters of vitamins—A, B, C, D, etc.—to indicate the causes of the symptoms and signs observed, *e.g.*, AC, DB_2 to indicate deficiency of A and C and D and B_2, respectively. *J. F. Corson.*

WILKINSON, P. B. & AU KING. **Amblyopia due to a Vitamin Deficiency.** *Lancet.* 1944, Apr. 22, 528–31, 3 figs.

This article appears to be a reproduction of one which appeared three years ago (*Caduceus*, 1941, v. 20, 13) though no reference is made to the latter.

During the two years before Hong Kong fell into the hands of the Japanese, diseases due to malnutrition became rife, including pellagra. In the last half of 1940, 15 patients complaining of dimness of vision were seen in which the amblyopia was apparently due to a vitamin deficiency. Such cases had not been previously observed. Examination revealed no abnormality in the media and no affection of the cornea or conjunctiva [no slit-lamp examinations were possible]. There were no signs of vitamin A deficiency. In 11 the fundus was normal; in four who had been ill 2 to 3 months optic atrophy, beginning with pallor of the temporal halves of the disks, was present, and was accompanied by sluggish pupillary reaction to light and poorly maintained contraction. Photophobia was rare. These symptoms were accompanied by concentric or quadrantic constriction of the visual fields but, it is noted, in no case was it possible to demonstrate any central or paracentral scotoma.

The cerebrospinal fluid was normal. It is interesting, however, to note that between them these 15 cases contributed the following other signs: sore tongue, angular stomatitis, scrotal eczema, giddiness, numbness of the face and extremities, paraesthesia and weakness of the limbs, but no objective sensory loss, no paralysis and no spasticity. One case exhibited a pellagrous rash. The diet consisted of polished rice and salt fish. All cases responded to yeast. A single case responded to a full hospital diet and then further improved after a week on 3 mgm. of riboflavin per diem. A second case did not improve on similar treatment but did so when 100 mgm. nicotinic acid were exhibited.

The cases obviously belong to that group collected together by the reviewer some years ago [this *Bulletin*, 1936, v. 33, 885] and again dealt with more recently (Lumleian Lectures, 1944). *H. S. Stannus.*

FERGUSON, W. J. W. **Ocular Signs of Riboflavin Deficiency.** *Lancet.* 1944, Apr. 1, 431–3, 2 figs.

After referring to the original observations of SYDENSTRICKER *et al.* [*Bulletin of Hygiene*, 1940, v. 15, 621] upon certain ocular signs and symptoms which responded to riboflavin therapy, and to the widely varying findings by many subsequent observers, the author says "I feel misinterpretation has arisen largely through lack of experience in the use of the slit-lamp, through imperfect understanding of the normal variations of the appearance and vascularity of the limbus and through inclusion of corneal vascularisation due to other causes than riboflavin deficiency." "Defining the normal," he goes on to state: "The limbic plexus is the circle of capillaries which surrounds the corneoscleral junction . . . . The limbus corneae is a narrow band, surrounding the true cornea, combining elements of both cornea and sclera." [Explanations which will not, perhaps, help the uninitiated very much.]

The author satisfied himself that there is a group of cases, amounting to 7·8 per cent of 422 persons examined in Sheffield, exhibiting corneal vascularization due to riboflavin deficiency These cases may complain of mild photophobia, burning sensations and ocular fatigue,

and also show lip, tongue and skin lesions, but none was seen with loss of visual acuity or signs of corneal inflammation.

[This paper is one of the best that has appeared on the subject.]

H. S. Stannus.

i. LYLE, T. K., MACRAE, T. F. & GARDINER, P. A. **Corneal Vascularisation in Nutritional Deficiency.** *Lancet*, 1944, Mar. 25, 393–5, 1 fig.

ii. SCOTT, J. G. **Corneal Vascularity as a Sign of Ariboflavinosis.** *J. Roy. Army Med. Corps.* 1944, Mar., v. 82, No. 3, 133–5. [11 refs.]

i. In their conclusions the authors state: "The degree of corneal vascularity was determined in about 4,000 R.A.F. personnel at 10 stations in this country and 12 stations overseas . . . . Many subjects receiving excellent dietaries had blood vessels on [sic] the cornea, and subjects with much corneal vascularity did not always improve when the diet was supplemented. Hence vascularity of the cornea is not necessarily evidence of deficiency in the diet.

"On the other hand, it was regularly found that there was little corneal vascularity where the food was good and more where food was less satisfactory."

It is not possible to summarize the results further as they embrace a large number of figures. The article will be read with interest by all those engaged in similar work but there is much that is open to criticism.

[(1) It is not stated whether or no observations were made with a slit-lamp. (2) The value of the ocular signs described, apart from other evidence, as diagnostic of riboflavin deficiency, is doubtful. (3) The method of notation adopted by quadrants, is one likely to lead to fallacies. (4) No reason is given for omitting an examination of the upper quadrant, which is as important as the other three. (5) The manner of "scoring" is unsatisfactory; to give an example: Type C in three quadrants yields the same total score of 12 as Type D say in the two lateral segments, but the "picture" in the two cases is very different. Progressive scoring should denote progression of the process under consideration. (6) Type B is labelled as "increase in vascularity of the limbus," but this is a misnomer. The word vascularity refers to a *state, i.e.* the number of vessels present, whether they be full or empty, visible or invisible. The vascularity of the limbic plexus does not change. Type B is really within the limits of normal. (7) No distinction is apparently made between vascularity and vascularization, which should be done; the latter is a *process* of change and the term is correctly used when applied to the clear cornea. (8) It is not clear what is meant by vessels *on* the cornea, they are in the cornea. (9) The results of riboflavin therapy appear to be inconclusive as the result perhaps of inaccurate diagnosis. For example: how explain the great difference in the figures, given in percentages, for 2 groups of men to each of whom 10 mgm. riboflavin was given daily?

group in "experiment 2";	23 improved,	60 unchanged,	17 worse
group in "experiment 3";	5 ,,	92 ,,	3 ,,

Vascularization of the cornea has been hailed as a sign from heaven; the truth is that without long study and very considerable experience of the whole problem, it can prove a snare and a delusion.]

ii. This second article refers to a rather similar survey carried out in the Gambia. Ocular manifestations were sought for, by means of

focal illumination and a binocular loupe, among 400 Europeans and 300 natives. Thirty-five per cent. of the former and 5 per cent. of the latter are stated to have shown corneal vascularization. Of 100 Europeans who had resided only two months in the country none showed the lesions of tongue or lips commonly ascribed to riboflavin deficiency, but in 24 corneal vascularization was found. Of 300 who had resided over 12 months, 24 showed cheilosis or glossitis, and in 38 corneal vascularization was found. Of 300 who had resided over 12 months, 24 showed cheilosis or glossitis, and 38 corneal vascularization.

In another group 136 Europeans were examined by slit-lamp; 26 exhibited no circum-corneal injection; 47 a few circum-corneal vessels; 3 many circum-corneal vessels; 54 invasion of clear cornea by vessels forming one arcade; 6 with more than 1 arcade. To 70 Europeans 6 mgm. riboflavin were given daily for 12 days—13 per cent. improved; 81 unchanged; 6 worse. Fifty received none—12 per cent. improved; 82 unchanged; 6 worse. Six Africans treated with riboflavin lost their mouth lesions in 7 days but there was no change in the cornea.

[These results cannot be looked upon as conclusive. Examination in much greater detail would be necessary, likewise bigger doses over longer periods would have to be tried. All the figures obtained by loupe examination, especially in the case of the dark-eyed natives, must remain doubtful.] *H. S. Stannus.*

HAEMATOLOGY.

GIBLIN, W. E. **Some Clinical Notes on Macrocytic Anaemia in New Guinea Natives.** *Med. J. Australia.* 1944, Jan. 29, v. 1, No. 5, 89–90.

Clinical observations over the last 20 years show macrocytic anemia among the natives of New Guinea to be characterized by (i) relatively acute onset with pyrexia, which may last weeks or months; (ii) rapid enlargement of the spleen, which is both painful and tender and diminishes in size during spontaneous remissions; (iii) the blood picture, as seen in stained films, of a macrocytic anaemia; (iv) rapid loss of weight; (v) spontaneous remissions and relapses.

There is also a more chronic type in which the spleen is enlarged but not painful. The anaemia is of low grade and is compatible with reasonably good health, but at times becomes more active, as for example in the latter months of pregnancy. It runs a non-febrile course and is amenable to liver therapy.

Most of the cases occurred among young adult males and the majority of the patients resided in the south-eastern division of Papua with Samarai as a centre. Malaria is hyperendemic, but the natives develop full immunity so that an adult is more or less free from attacks of malaria. *F. Murgatroyd.*

SIPPE, G. R. **Autolysed Yeast in the Treatment of Nutritional Macrocytic Anaemia.** *Brit. Med. J.* 1944, May 13, 656–8.

It is agreed that nutritional macrocytic anaemia, as found in India, China, Africa and Macedonia, is a deficiency disease. It is found in both sexes and is most prevalent in the second and third decades; it

is especially apt to appear during the latter half of pregnancy, and in the presence of malarial splenomegaly it is probable that the disease is aggravated by excessive destruction of normal and abnormal eyrthrocytes by the hypertrophied reticulo-endothelial system. [See FAIRLEY *et al.*, this *Bulletin*, 1939, v. 36, 422.]

The exact part played by dietetic deficiencies in this disease is obscure. Autolysed yeast (Marmite) and crude liver extract both produce a maximal reticulocyte response, but the results with anahaemin have been variable. [WILLS & EVANS, this *Bulletin*, 1938, v. 35, 846; NAPIER *et al.*, *ibid.*, 846.] The active factor, or factors, appear to be water-soluble, heat-stable in an acid medium and partially resistant to autoclaving in an alkaline medium. The potent substances can be obtained by extraction of beef flesh with 70 or 80 per cent. alcohol, but the potency is lost in concentrations of 90 per cent. alcohol [FORMIJNE, this *Bulletin*, 1941, v. 38, 668]. Fractionating Campolon into soluble and insoluble portions with ammonium sulphate, it has been found that the insoluble portion (containing the major part of the anahaemin) was very potent in pernicious anaemia but was inactive in artificially induced anaemia in monkeys (which was considered to be the counterpart of the nutritional macrocytic anaemia of man), while the soluble portion was active in both conditions (WILLS, CLUTTERBUCK & EVANS, *Biochem. J.*, 1937, v. 31, 2136); [this *Bulletin*, 1937, v. 34, 501].

It is possible there are two essential haematopoietic dietary factors, one which reacts with the intrinsic factor to form the liver principle, and the other, found in crude liver extracts and not precipitated with saturated ammonium sulphate, which is necessary for the activity of pure liver extracts (WILLS *et al.*, *loc. cit.*). The commonest source of these factors in the average diet is beef flesh; autolysed yeast (Marmite) is extremely potent, but watery yeast extract and dried yeast powder are inactive (WILLS, *Indian J. Med. Res.*, 1934, v. 21, 669).

A number of cases of nutritional macrocytic anaemia were treated in Mauritius with yeast obtained locally as a waste product in the manufacture of alcohol by fermentation of molasses. The yeast mixture is obtained from the bottom of the vat after fermentation has ceased and the top fluid has been run off. Normally this sediment is discharged on the fields, where, on account of its nitrogen content, it has some value as a fertilizer. The sediment (yeast mixture) has the consistency of thin gruel and is brownish in colour; the taste is not pleasant, but water and sugar render it more palatable. Occasionally it produces vomiting and diarrhoea, probably owing to the taste and acidity of the mixture, which has to be taken in comparatively large amounts, and to the insoluble material present in the residue; it may be possible to improve it in these respects by preliminary washing and evaporation. Before use the mixture should be passed through cheese cloth or a fine screen and afterwards sterilized at 70°C. for 1 hour, which not only kills pathogenic organisms but also the yeast cells themselves and so hastens autolysis.

To produce a satisfactory blood response three to six ounces of the mixture were required daily, although in pregnancy, especially during the latter half, the bone marrow sometimes failed to react even with very large doses.

Analysis of mixtures from two separate distilleries showed one mixture to contain a large amount of inert calcium sulphate resulting from the bleaching process used to produce white (bleached) sugar.

This salt may, possibly because of its bulk, give rise to the diarrhoea, and it is proposed therefore, in future, to use mixtures from distilleries producing raw (unbleached) sugar; mixtures from such distilleries, beside being free from calcium sulphate, have a higher yeast content.

Autolysed yeast sediments contain, in addition to the haematopoietic principles, members of the vitamin B complex valuable in the treatment of pellagrous dermatitis, angular stomatitis and glossitis. They are also acceptable to religious sects who will not eat beef flesh. Finally, obtained as a waste product, they are cheap and can readily be made available to all sections of the community.

F. Murgatroyd.

VENOMS AND ANTIVENENES.

SERGENT, E. Sérothérapie antiscorpionique. (Sixième note.) Observations médicales reçues pendant l'année 1942. [**Treatment by Scorpion Antivenene.**] *Arch. Inst. Pasteur d'Algérie.* 1943, Sept., v. 21, No. 3, 186–202.

The author has brought his record of the value of this treatment up to the year 1942; previous records were abstracted in this *Bulletin*, 1943, v. 40, 485, where references to earlier work are given. During 1942 the number of cases treated was 177. The scorpions were identified in 24 cases, as follows:—*Prionurus australis* 18, *P. amoreuxi* 1, *P. hoggarensis* 1, *P. liouvillei* 1, *Hottentota gentili* 1, *Buthus occitanus* 2. In 66 cases the clinical condition was noted as grave, but 56 of these patients were cured and the symptoms were rapidly relieved, usually within 24 hours. Details are given of the 66 patients, and of 9 who were not treated with serum and who died.

Since this treatment was instituted in 1936, 284 persons with grave symptoms have received antivenene, and 85·2 per cent. of them recovered. In 94 of those who recovered death appeared to be imminent at the time of injection. In 24 death occurred in spite of the serum, but in 12 of these administration was too late, in 10 in insufficient dosage, in 2 both too late and too little. In a letter from Dr. VIAUD it is suggested that the routine dose for every person stung by a scorpion should be 10 cc. of the serum.

Charles Wilcocks.

DERMATOLOGY AND FUNGOUS DISEASES.

MOORE, M. & JORSTAD, L. H. **Histoplasmosis and its Importance to Otorhinolaryngologists. A Review with Report of a New Case.** *Ann. Otology, Rhinology & Laryngology.* 1943, Dec., v. 52, No. 4, 779–815, 12 figs. [61 refs.]

The authors describe a case of histoplasmosis affecting the mucosa of the palate and lower jaw of a man aged 67. Two months after the granulomatous and ulcerating lesions had been noticed, repeated, but unsuccessful, attempts were made, with the use of the cautery, to extirpate the disease, and the patient died five months later. The diagnosis was based on histological examination of material obtained by

biopsy from the lesions in the mouth. In its terminal stages the disease was characterized by secondary anaemia, fever, debility and "irrational" behaviour, and generalization of the infection was suggested by enlargement of the liver and spleen, and diffuse shadows shown in X-ray films of the lungs. Autopsy was not permitted.

The greater part of the paper is devoted to a survey of the literature of histoplasmosis, with a table compiled from the records of 22 cases of special interest to oto-laryngologists. A bibliography of 61 references is appended. *J. T. Duncan.*

MISCELLANEOUS.

J. Amer. Med. Ass. 1943, Dec. 18, v. 123, No. 16, 1052–3. **Tropical Diseases in Returning Military Personnel.**

This statement was published at the request of the Sub-committee on Tropical Diseases of the National Research Council of the United States. It refers to certain tropical diseases which may be found in members of the forces who have served overseas, and draws the attention of American medical men to the fact that, unless these diseases are borne in mind, mistaken diagnosis may be made which may endanger the lives of the patients, and to the possibility that returning patients may initiate spread of some of the diseases among the people of the United States. [Both these points of view should be remembered in Britain.]

Malaria should be suspected in every person returning from the tropics or subtropics; it may simulate abdominal or respiratory diseases, meningitis, coma from other causes, or anaemia. Diagnosis should be sought by repeated blood examination, and treatment, when diagnosis is made, should be vigorous. It is important that the species of parasite should be determined. Mosquitoes capable of spreading malaria exist abundantly in certain States [and are found in certain parts of England].

Bacillary dysentery should be suspected in cases of chronic diarrhoea, and bacteriological examination should be made; transient or chronic carriers of the organisms are often found in contacts. Amoebiasis may be present even if the patient gives no history of an acute attack of dysentery, and liver abscess may form long after return from the tropics. Amoebiasis should be suspected in any person from the tropics who has blood in the stool, alternating diarrhoea and constipation, or vague abdominal symptoms. Diagnosis demands expert skill and experience.

Filariasis has been contracted by American soldiers in the South-West Pacific. Some of these men may have been discharged from the service during the long incubation period, and come under civilian medical care during the first attack of lymphangitis, the cause of which may not be appreciated unless blood examination is made. There is no specific treatment, though sulphonamides are useful in lymphangitis. Mosquitoes capable of transmitting filariasis are present in parts of the United States, but it is improbable that the disease will spread.

Other diseases mentioned are leishmaniasis, schistosomiasis, infections with *Loa loa* and *Onchocerca*, African trypanosomiasis, leprosy,

relapsing fever and various skin diseases caused by fungi. Though it is not likely that any of these will spread, they should be remembered in the problem of diagnosis.

The authors of the statement advise physicians and health departments to prepare themselves for diagnosis, treatment and control of these diseases [the advice applies to Britain no less than to the United States]. *Charles Wilcocks.*

JOUBERT, J. D. **Midwifery in the Transkei with particular reference to Vesico-Vaginal Fistulae.** *South African Med. J.* 1944, Jan. 22, v. 18, No. 2, 19–20.

From his experience of medical work in the Transkei region of South Africa, the author concludes that the general belief that the native woman has her babies easily is a myth, and that similar abnormalities to those met with in European women occur, but with the added disadvantages of poor diet, often chronic ill health, and lack of medical assistance until the patient's condition is critical. There is one blessing, however, "severe toxaemias of pregnancy, particularly eclampsia, are extremely rare."

The results of neglected labours are exhaustion, shock, ruptured uterus, toxaemia or septicaemia, and, very frequently, sloughing of the vaginal wall giving rise to vesico-vaginal or recto-vaginal fistulae.

The rest of the article is concerned with the types of operation which the author has found most successful for repairing vesico-vaginal fistulae.

Implantation of the ureters into the bowel was the operation most usually adopted. Spinal anaesthesia was preferred to general.

Emphasis, however, is laid on the need for preventing the development of such fistulae, more doctors, more trained midwives and more ambulances being advocated. *M. G. Blacklock.*

PARSONS-SMITH, B. G. **Tropical Eosinophilia.** *Lancet.* 1944, Apr. 1, 433–4.

A typical example of "tropical eosinophilic lung" is recorded, this time in a European in Egypt. The symptoms began to develop after the patient had been living near Cairo for about eight months. As usual, the diagnosis of asthma was made and the usual antispasmodics prescribed, without benefit. The leucocytosis was at no time very great; the highest noted was 20,000 per cmm. and the proportion of eosinophiles did not exceed 34 per cent. Treatment by arsenic (neoarsphenamine) brought about, as usual, at first an increase in leucocyte total and eosinophile proportion, soon followed by reduction, and restoration to health.

This disease, at first thought to be peculiar to India and especially the Bombay district of the west coast, has now been reported from the United States of America and from Egypt. [The author states categorically "it is not considered to be an allergic state" but does not give his authorities or reasons. Though the cause is not yet known, many believe it to be allergic. See also this *Bulletin*, 1944, v. 41, 517.]

H. Harold Scott.

MAYER, J. H. & FINLAYSON, M. H. **Chronic Melioidosis : a Case showing Bone and Pulmonary Lesions.** *J. Roy. Army Med. Corps.* 1944, Jan., v. 82, No. 1, 4–13, 3 figs. [11 refs.] Also in *South African Med. J.* 1944, Apr. 8, v. 18, No. 7, 109–12. [11 refs.]

This paper describes a chronic case of melioidosis in a soldier which commenced insidiously in June 1940, 1 year and 8 months after he had arrived in Singapore. His illness began with lumbo-sacral pain radiating down both thighs. When seen one month after onset he had irregular pyrexia, profuse night sweats and an absence of physical signs apart from stiffness of the lumbar spine and some enlargement of the inguinal glands. Laboratory investigations in the early stages revealed nothing of importance except a raised blood sedimentation rate (60 mm.) and a provisional diagnosis of spondylitis ankylopoietica was made. In January 1941 a lumbo-sacral abscess developed to be followed in turn during the subsequent 18 months by abscesses involving the right sacro-iliac joint, the left sacro-iliac joint, the 8th dorsal vertebra and the right hip joint. In May 1942, X-ray of the chest showed extensive infiltration at the right base, bilateral apical pleural thickening and hilar enlargement. The diagnosis by this time had been changed to one of tuberculous sacro-iliac arthritis, but examination of many specimens of sputum and two of pus proved negative for *Myco. tuberculosis*. In March 1943, the patient, who had been transferred to South Africa, came under observation by the authors and in April *Pf. whitmori* was isolated in pure culture from pus obtained from an abscess pointing in the right thigh. Examination of the sputum for acid-fast bacilli, culture of the blood and faeces for *Pf. whitmori* and examination of the serum for agglutinins for the enteric, brucella and proteus groups all proved negative, as did the Wassermann, Kahn and gonococcal complement fixation test ; the patient's serum agglutinated *Pf. whitmori* to a dilution of 1 in 500. Earlier in the disease sulphapyridine had been tried without effect and in the absence of sulphadiazine the patient was started on a course of a vaccine made from the causal organism, with a first dose of 10 million. At the time of writing (June 1943) the dose had been increased to 100 million, the sinuses were all dry, the temperature was settling down and the patient's condition was improving. The organisms isolated from the pus in April, 1943 proved to be typical of *Pf. whitmori* and appeared to be in the smooth phase when first obtained. The authors noted, however, that acid-fast granules could be demonstrated by staining with carbol fuchsin and decolorizing with 10 per cent. acetic acid or 2½ per cent. sulphuric acid for 5 minutes. In old broth cultures the acid-fastness of these granules, which occurred both inside bacilli and free, was more pronounced, but they were readily decolorized by alcohol. The patient did not react positively to a subcutaneous injection of 0·2 cc. of a 1 in 10 dilution of mallein. *S. P. Bedson.*

CLELAND, J. B. **Insects in their Relationship to Injury and Disease in Man in Australia. Series IV.** *Med. J. Australia.* 1944, Jan. 1, v. 1, No. 1, 7–10. [26 refs.]

In this article the author quotes numerous instances of injuries to man, chiefly of the eyes and skin, caused by bites or secretions of the more common insects found in Australia. The chief offenders are the ubiquitous lice, bugs and fleas ; among the bugs, the crusader and

bronzy orange bugs both secrete fluids which can be discharged for some distance and which, on contact, cause painful irritation to the eyes. Instances are also given of painful bites by various species of beetles, ants and wasps, and of skin rashes caused by contact with hairs of caterpillars (*Euproctis edwardsi*, *Euproctis chrysorrhaea*, *Chelepteryx collesi*).

The author also quotes extracts from papers of historical interest which describe in a picturesque manner the torments suffered during the last century by early explorers and Governors alike.

S. Barnes.

FIASSON, R. Contribution à l'étude des arthropodes vulnérants du Moyen-Congo. [**A Contribution to our Knowledge of the Biting Insects and other Arthropods of the Middle Congo.**] *Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* 1943, July, v. 2, No. 3, 257–82, 2 figs. & 1 coloured pl. [17 refs.]

The author presents a list with comments on ticks, parasitic mites, and biting insects, collected in the Middle Congo (the Gaboon, Brazzaville, etc.). It includes forms which attack man, domestic and wild animals. The work must have been carried through under conditions of isolation and difficulty.

It is difficult to summarize such a work. In reading the paper one observes that though the author collected nearly a score of Ixodidae he records no *Ornithodorus*. Human scabies is abundant. The dog flea (*Ctenocephalides canis*) occurs on man commonly, and *Pulex irritans* was not found. *Chrysops silaceus* is abundant in the Gaboon and Komono areas, at certain seasons only. The breeding place, in spite of much work, remains undiscovered. At one village 6/15 children of ten or twelve years old had microfilaria (presumably *Loa loa*) in the blood at 10 a.m. Of 77 *C. silaceus* dissected in the same region, four had nematode larvae in the fat body; in two there were also large larvae in the base of the proboscis. *Glossina palpalis* is common, and the only other species recorded is *G. fusca*. *Anopheles funestus* is recorded from Tibesti (Chad Province) which is an interesting extension of its known range.

P. A. Buxton.

HESS, A. D. & HALL, T. F. **The Intersection Line as a Factor in Anopheline Ecology.** *J. National Malaria Soc.* Tallahassee, Fla. 1943, v. 2, No. 2, 93–8, 2 figs.

As a result of previous observation it had been recognized that there was a relation between the production of *Anopheles quadrimaculatus* and the presence of vegetation in the breeding place. Analysis of the situation has now shown that the important factor is the length of the marginal line between water and floating leaves, etc., in a given area. This "intersection line" can be alternatively explained as "the line of intersection between three interfaces, water-air, water-plant, and plant-air." The length of intersection line in metres per square metre of water surface gives the "intersection value." Experiments were made in which frames 8 inches deep and ½–1 metre square were put down in water where the lotus (*Nelumbo lutea*) with round leaves was growing. The diameters (and hence the perimeters) of the enclosed leaves were measured and then the larvae (which did not escape below

the frames) were counted. The perimeter length per sq. metre (intersection value) is low either when there are few leaves, or almost complete coverage by overlapping leaves, so that maximum number of larvae would be expected at intermediate values. This was found to be the case, and there was throughout a strong positive correlation between intersection values and number of larvae recovered. It remains to be seen whether the relationship between intersection value and the number of larvae holds for other types of vegetation. It is suggested that the intersection line might provide shelter and food (epiphytic algae) as well as facilities for oviposition. The importance of this observation, in connexion with larval control by altering the water level, is obvious: conditions of high intersection value for the particular type of vegetation will have to be avoided if the idea is found to be applicable to other types of vegetation and species of larvae.

W. A. L. David.

LUMSDEN, W. H. R. *Anopheles hispaniola,* **Theobald, 1903 (Dipt., Culicid.) from the Emirate of Transjordan.** *Bull. Entom. Res.* 1944, Apr., v. 35, Pt. 1, 3–9. [10 refs.]

SICART, M. Contribution à l'étude des anophèles de Tunisie. Présence de *Anopheles* (*A*) *marteri* (Senevet et Prunelle 1927). [*A. marteri* **in Tunisia.**] *Arch. Inst. Pasteur de Tunis.* 1942, June, v. 31, No. 1–2, 132–4, 1 fig.

PARROT, L. Notes sur les phlébotomes. XL. Sur *Phlebotomus* (*Prophlebotomus*) *minutus* Rondani et sa variété *parroti* Adler et Theodor. [*Phlebotomus minutus* **and its Variety** *parroti*.] *Arch. Inst. Pasteur d'Algérie.* 1943, v. 21, No. 1, 38–50, 6 figs. [36 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Apr., v. 32, Pt. 4, 66.]

Both sexes of *Phlebotomus minutus,* Rond. and *P. minutus* var. *parroti,* Adl. & Thdr., are described. The typical form, of which *P. parroti* var. *sardous,* Bogliolo is considered a synonym, apparently occurs throughout the European part of the Mediterranean basin from Spain to Crete, and the author has a specimen from the Crimea. It is replaced in North Africa by var. *parroti,* which occurs throughout Algeria, Tunisia and Morocco from the Mediterranean coast to the northern Sahara, in both inhabited and uninhabited places. Very brief notes are given from the literature on the feeding habits of both, the probability that they are vectors of parasites of the gecko, *Tarentola mauritanica,* and the rearing of var. *parroti.* Neither is thought to bite man.

FELDMAN-MUHSAM, B. **Studies on the Ecology of the Levant House Fly** (*Musca domestica vicina* **Macq.**). *Bull. Entom. Res.* 1944, Apr., v. 35, Pt. 1, 53–67, 5 figs. [15 refs.]

WIGGLESWORTH, V. B. **Action of Inert Dusts on Insects.** [Correspondence.] *Nature.* 1944, Apr. 22, 493–4, 2 figs.

It has previously been proved that chemically inert dusts kill insects by increasing the rate of water loss through the cuticle. Evidence is produced to show that simple abrasion of the film of wax lying outside the epicuticle is one of the most important factors in bringing about

this result. Merely dusting a suspended insect does not produce an increased rate of water loss because abrasion cannot take place; the increase is, however, very marked when an insect runs over a lightly dusted substratum. In the latter case the abrasion, which is not directly visible, may be demonstrated by treating the exposed region with ammoniacal silver hydroxide, which is reduced only in the abraded region by the polyphenols of the exposed layer of cuticle. The impermeability is restored if the living insect is kept in a moist atmosphere for some days. It can be shown that abrasion with dusts greatly reduces the time which insecticides such as nicotine and rotenone take to penetrate into the insect. This may explain the observation that in practice certain dusts favour the action of insecticides.

W. A. L. David.

MAYFIELD, M. Frances. **The Excystation, Cultivation and Encystation of *Endamoeba coli*.** *Proc. Soc. Exper. Biol. & Med.* 1944, Jan., v. 55, No. 1, 20–22.

The author, calling attention to the difficulties encountered by other observers [see DOBELL, this *Bulletin*, 1937, v. 34, 507] in obtaining and maintaining cultures of *Entamoeba coli*, reports successes he has had by inoculating a medium consisting of egg slants covered by Locke's serum solution, to which starch was added. Cysts were obtained from 24 pure infections by a zinc sulphate centrifugal floatation method. Large doses of saline-washed cysts were inoculated to the medium. In 15 instances excystation occurred, and the amoebae growing abundantly were maintained in culture for varying periods between 4 and 19 months. Two attempts to obtain cultures from trophozoites only failed. Cyst formation occurred spontaneously in cultures on four occasions, but the circumstances favouring this could not be reproduced at will. The cultures were incubated at 37°C., the medium having an initial *p*H of 7·8–8·0, and a final *p*H of 6·8–7·0.

C. M. Wenyon.

WENRICH, D. H. **Comparative Morphology of the Trichomonad Flagellates of Man.** *Amer. J. Trop. Med.* 1944, Jan., v. 24, No. 1 39–51, 3 text figs. & 19 figs. on 2 pls. [38 refs.]

Of the three trichomonad flagellates of man *Trichomonas hominis* is a species apart, for *T. vaginalis* and *T. tenax* (the name adopted for the oral form) are closely related, though sufficiently distinct to be regarded as separate species. The last two have as a rule a single compound blepharoplast, from which four anteriorly directed flagella arise. *T. hominis*, on the other hand, has two blepharoplasts, a ventral small one, from which a single flagellum arises, and a dorsal larger one, from which usually four, but sometimes three or even two flagella originate. The undulating membrane of *T. vaginalis* and *T. tenax* is considerably shorter than the body, and there is no free flagellum, while that of *T. hominis* is the length of the body with a long free flagellum beyond it. The costa and axostyle in *T. hominis* are coarser than in the other forms, which also resemble one another in the possession of a well-formed parabasal apparatus which is absent in *T. hominis*. Though *T. vaginalis* and *T. tenax* resemble one another so closely, the former is larger and has a relatively shorter membrane. A fourth trichomonad, *T. faecalis*, has been observed only once in a tapwater

culture of human faeces. The author favours the view that this is really *T. batrachorum* of frogs and toads, and not a human parasite at all. The paper, which is well illustrated, gives a detailed description of the three human trichomonads as well as the experimental evidence, which is all in favour of regarding them as species distinct from one another. It is a valuable and well-illustrated contribution which should do much to clear away a good deal of existing confusion regarding the trichomonad flagellates of man. *C. M. Wenyon.*

WENRICH, D. H. **Morphology of the Intestinal Trichomonad Flagellates in Man and of Similar Forms in Monkeys, Cats, Dogs and Rats.** *J. Morphology.* 1944, Jan., v. 74, No. 1, 189–211, 2 pls. (20 figs.). [42 refs.]

In this paper the author gives a detailed description of the morphology of the human intestinal trichomonas, which usually has five but may have four or three anterior flagella. The name of this flagellate is *Trichomonas hominis*, and it appears to be identical with certain trichomonads from monkeys, cats, dogs and rats. This paper can with profit be read with that by the same author reviewed above.

C. M. Wenyon.

BOOK REVIEWS.

TAYLOR, F. H. **The Intermediary Hosts of Malaria in the Netherlands Indies.** *Commonwealth of Australia Dept. of Health Service Publication (School of Public Health and Tropical Medicine). No. 5.* 1943. Dec. 24. 85 pp. With 24 figs. & 15 maps. Glebe, New South Wales: Australasian Medical Publishing Company, Ltd., Seamer Street.

This publication contains four keys to species, two keys to the subgenera of *Anopheles*, descriptions of species, notes on their relation to malaria, their habitats and distribution.

The first key is to the adult female *Anopheles* of the Malayan region, including Siam, French Indo-China, Malaya, Sumatra, Java and Borneo; the second is to the fourth stage larvae of the species of the same region; the third key is to the adult females of the Australian region (including Papua, Melanesia, etc.); the fourth to the fourth stage larvae of the same region. These four keys are taken direct from RUSSELL, ROSEBOOM & STONE ("*Keys to the Anopheline Mosquitoes of the World,*" Philadelphia, 1943) [this *Bulletin*, 1944, v. 41, 325]. The two keys to the subgenera of Anopheles are to the adults and the fourth stage larvae respectively.

The descriptions (of the males, females, pupae, larvae and eggs, where these different stages are all known) are taken, with a few exceptions, from the publications of GATER ("*Aids to the Identification of Anopheline Larvae in Malaya*" and "*Aids to the Identification of Anopheline Imagines in Malaya,*" Govt. Printing Office, Singapore, 1934 and 1936) [this *Bulletin*, 1934, v. 31, 755; 1936, v. 33, 497]. All the illustrations except one are taken from GATER'S publications (*op. cit.*). The species named in the keys are not all described, purely Australian

ones being omitted, as are those for which there is evidence that they do not act, or are incapable of acting, as malaria vectors.

The distribution maps published by SWELLENGREBEL & RODENWALDT ("*Die Anophelen von Niederländisch-Ostindien*," Jena, 1932) [this *Bulletin*, 1932, v. 29, 468] are reproduced, along with the lists of localities given by these authors.

Control measures are omitted, having been dealt with in a companion publication of Taylor's ("*Mosquito Intermediary Hosts of Disease in Australia and New Guinea*," Service Publication No. 4, Commonwealth Dept. Health 1943) [this *Bulletin*, 1944, v. 41, 81]. It is also intended that this latter publication be used in those parts of the Netherlands-Indies that are zoogeographically Australian, *viz.*, Dutch New Guinea, Timor, Moluccas and the neighbouring smaller islands.

In the keys the infra-specific categories are designated by the use of trinominal names, while in the descriptive matter they are labelled with the more conservative and familiar " var." ; there is no explanation in the text of this difference of usage.

There is no introductory matter, the reader being presumed to know the rudiments of Culicid morphology. *John Smart.*

SOPER, Fred L., WILSON, D. Bruce, LIMA, Servulo & ANTUNES, Waldemar Sá. **The Organization of Permanent Nation-Wide Anti-*Aëdes aegypti* Measures in Brazil.** 137 pp. With 27 figs. (9 on 5 pls.) & 2 maps. 1943. New York: The Rockefeller Foundation.

Sir Malcolm WATSON, when speaking at the Royal Society of Tropical Medicine and Hygiene in 1938, said: " I am generally familiar with mosquito control but that which I saw in Brazil a couple of years ago, in connection with anti-yellow fever work, was something quite beyond my experience. I feel sure that the Rockefeller Foundation would be doing a real service if they would give a detailed account of the wonderful work and wonderful organization which exist in Brazil . . . so that in other countries men who are faced with the problem of mosquito control will have this invaluable guide."

The volume under review is a partial answer to that request. It is a book written by experts for experts, and the authors, who have established reputations in many wide fields of yellow fever control, have confined themselves with meticulous care to the narrow limits specified by the title of the book. Thus, to mention two points only, the reader will find no reference to a single vector of yellow fever other than *Aëdes aegypti*, nor will he find any mention, outside the introduction, of any of the methods used for the control of the disease except those directly concerned with the destruction of this one particular species. The book has many points in common with an Army manual and, through no fault of the authors, has similarly a certain amount of dull reading-matter ; but this is compensated for by a wealth of interesting information. The general administration and routine organization of the " Yellow Fever Service " in urban centres and areas are described and analysed as if they were those of a combatant army, and details are given of the constitution of the service, its various ranks, and the means of recognizing them, both by their badges and by the flags which announce the presence of the commanding officer or mark the field of battle. It goes on to describe the duties of each warrior in this army, the anti-mosquito weapons which he must carry, the maps and

charts he must consult, and all the numerous and complicated forms which he must fill in. It tells him exactly what he must do not only when faced by his mosquito-enemy, but also when confronted by the truculent householder or by the cowardly delinquent who leaves his house empty but locked. Having dealt with the main army in the urban area, it goes on to describe the organization and maintenance of the guerilla warfare constantly being waged in the interior of Brazil by those members of the Yellow Fever Service who have been sent to fight against jungle yellow fever, while the important part played by the auxiliary Maritime and River Services is also described. This close analogy between the health army and the combatant army of a country is well illustrated by the comparative ease with which money is raised and support gained during times of peril, as compared with the niggardly financial dole and indifferent or even obstructive policy of the public in times of security. In the authors' own words: "At the time of a yellow fever epidemic, or under threat of importation of the infection from near-by epidemic areas, adequate funds are easily obtained to prevent a public calamity, and the health officer is judged not by the amount of money spent but by the immediate results of the campaign. Once the threat of yellow fever passes, however, government authorities and the health officer begin to consider the question of expense, which is indeed heavy in comparison with other important health measures."

The last part of the book deals with such questions as the methods of marking maps and charts and of calculating the statistical information required; there is also an important section describing how legal enforcement can be put into operation, with copies of the various legal documents in use. The volume ends with an appendix quoting the government regulations for the prevention of yellow fever in Brazil.

This book of 137 pages is well printed and well illustrated, and is altogether on a generous scale. The pages measure 11 in. by 8 in., with wide margins and large print. Photographs and plans occupy much of the space and are of the same lavish type, one whole page being devoted to a diagram showing how to place the yellow fever service flag in a building where an inspector is at work, while another four pages show, by means of diagrams, the exact shape, size and colour of the flags of the various Services. The price of the volume is not mentioned.

The authors, in their introduction, rightly state that "Work worth doing is worth recording." This volume by Dr. Soper and his colleagues is an account of work finely done and well recorded.

R. M. Gordon.

MEDICAL RESEARCH COUNCIL. Spec. Rep. Ser. No. 248. **A Provisional Classification of Diseases and Injuries for Use in Compiling Morbidity Statistics by the Committee on Hospital Morbidity Statistics.**—168 pp. 1944. London: H.M. Stationery Office. [3*s*.]

Index to the Manual of the International List of Causes of Death (5th Revision, 1938) for Use with the Medical Research Council's Provisional Classification of Diseases and Injuries, 1943 (Special Report Series, No. 248).—92 pp. 1944. London: H.M. Stationery Office. [2*s*.]

Statistics of causes of death have become firmly based upon the International List, but although the need for a parallel classification

for statistics of morbidity has been continually in the minds of those responsible for revising the death classification, the question was still under discussion before the war. In Canada a classification was compiled and has been employed in some useful morbidity studies ; and in the United States of America a diagnosis code has for some time been in process of evolution. In Britain morbidity statistics have suffered from lack of comparability both as regards the contents of groups of similar title and the rules of selection where several morbid conditions are present. The Nuffield Provincial Hospitals Trust and those responsible for the Medical History of the War realized independently about 1941 that a standard classification had become an urgent necessity, and the sequel was the appointment of a Committee of the Medical Research Council to prepare one. Their labours have resulted in the publication of this " Provisional Classification of Diseases and Injuries."

During the preparation of the classification its practical application was thoroughly tested in the coding of more than 50,000 in-patient records from all types of E.M.S. Hospitals, and such modifications were made as were found necessary. It can be said, therefore, that notwithstanding their complexity at first sight, the list and coding rules have been proved to be workable by Coders without special medical training. Already the code has been in use for E.M.S. in-patient records for more than a year ; it has been adopted in condensed form by the Ministry of Pensions, the Nuffield Bureaux of Sickness Records, and the Industrial Health Research Board, and is being used in health surveys by the Ministry of Health and Wartime Social Survey and for hospital records by the Middlesex County Council.

The main framework is the same as that of the International List of Causes of Death, but the arrangement of diseases within the sections is designed to meet the needs of morbidity classification and a much larger number of subgroups therefore appear. In a few instances diseases have been transferred to different sections as a result of new knowledge since the 1938 revision of the list. The assignment of the various diseases and synonyms in the Manual of the International List to the appropriate morbidity group is clearly shown, and it is thus possible for the Coder to find the required code number for any of the 10,000 terms in the index of that Manual. To facilitate this, H.M. Stationery Office have issued separately an " Index to the Manual of the International List of Causes of Death " (see above), and where coding of records is to be carried out for statistical purposes a copy of this should be obtained. There are sections in the code for ill-defined conditions and symptoms, in order to provide for cases where no definite diagnosis was made. Injuries are coded on a four-fold basis, by type of injury, anatomical location, external cause and mode of infliction (*i.e.* war, accident, self-infliction, or injury by another person). The code is designed both for writing on records and for machine-card punching.

For most purposes statistics of morbidity will be based upon the final diagnosis of the condition for which the patient was first admitted to treatment, and rules by which coders can determine this are laid down. The importance of standardizing this selection has recently been stressed in the Hospital Discharge Study of the Welfare Council of New York as a result of the difficulties experienced in that survey. For other purposes, such as hospital indexing, research and studies of complications and associations between diseases, it may be necessary to code other morbid conditions in the patient, and this is provided for by the suggestion that the principal complication or secondary disease,

and the principal acute and principal chronic morbid conditions (independent of the primary), should be coded where such are present.

This Classification provides a basis for standardized statistics of morbidity, not only for hospitals but for many branches of social medicine, and everyone interested in these matters should become acquainted with it. *Percy Stocks.*

GARRY, T. Gerald [M.B.E., M.D., etc.]. **The Prevention and Treatment of Disease in Warm Climates.** 94 pp. 1944. London: Messrs. Hutchinson & Co. (Publishers), Ltd., 47, Princes Gate, S.W.7.

The book is intended for the use of people living in the tropics in places where medical assistance is unobtainable; the author also thinks that doctors may get some useful hints from it. The first half deals with health in the tropics and includes advice on diet, exercise, clothing, insect pests and personal hygiene; in the second half the more important tropical diseases and some of the minor ailments are considered. There are two appendices: one is on sulphonamide compounds, while the other consists of 10 cookery recipes.

It cannot be said that the first part adds anything of importance to the information already available in several good medical guides for laymen in the tropics; there are some errors, *e.g.*, on page 22 it is stated that the average weekly allowance of food should contain 3,000 or 3,400 calories and 37 or 50 gm. of protein, the authorities quoted being the British Medical Association and the Ministry of Health.

In the second part there are many errors: prescriptions are written in a peculiar way: for bacillary dysentery:—Sod. sulph. 2 oz. (two small teaspoonfuls), acid sulph. dil. MXii, tin cardamins MX, aqu. Chlorof. ad. 1 oz.; for malaria:—Quin sulphate gr. X; acid sulph. aromatic, M 10; syrupi lem. one ounce aqun. chlorof. ad. oz. js.; and so on. Scientific names are often wrongly spelt: Bacillus Pestes (twice), *aedes aegypte. culex Fatigans*, Impetigo contagioso, etc.

A doctor in the tropics would not find this book a useful addition to his library, and it is hard to understand how the second part could give much help to laymen untrained in microscopical diagnostic methods. *J. F. Corson.*

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